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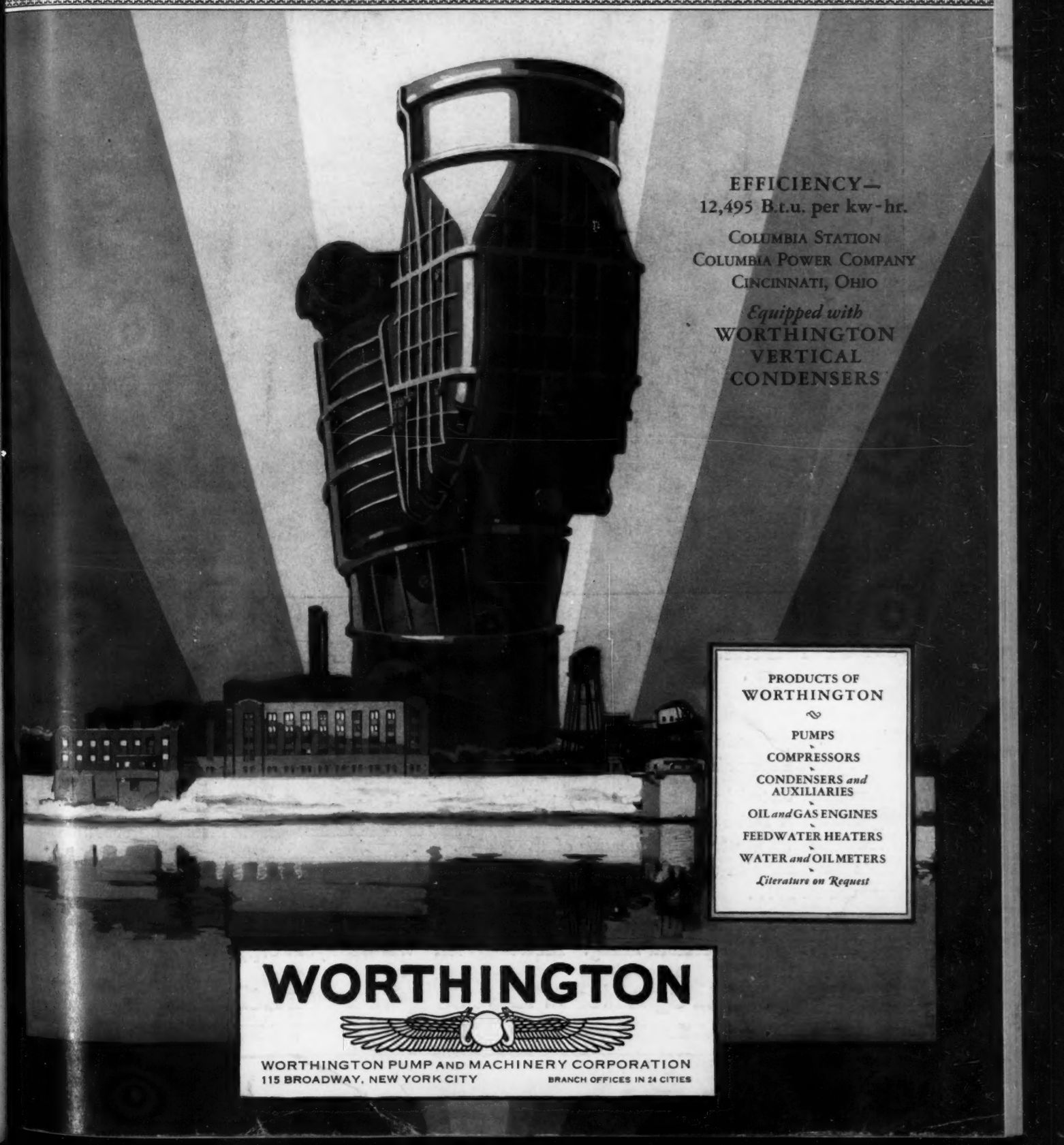

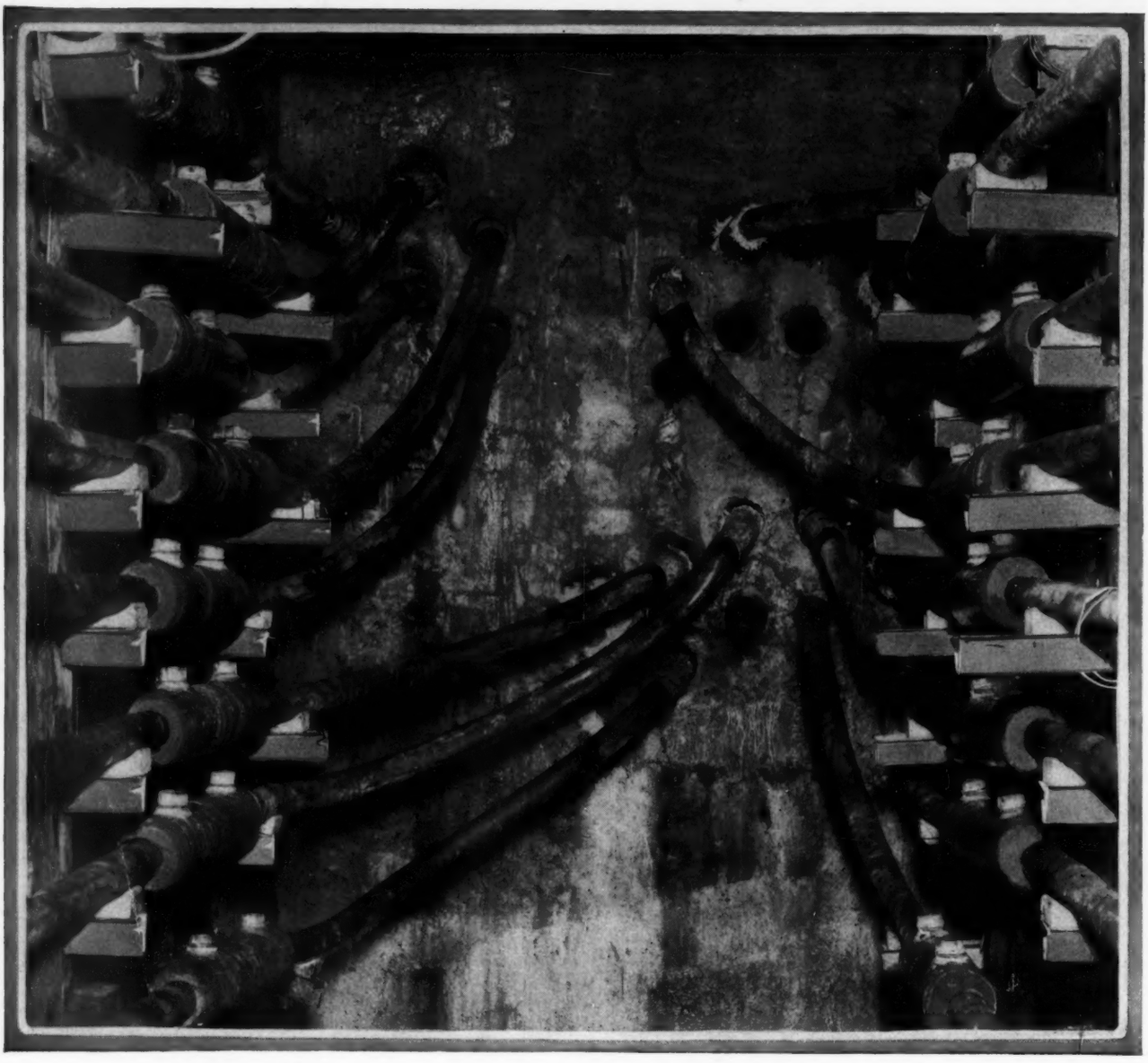

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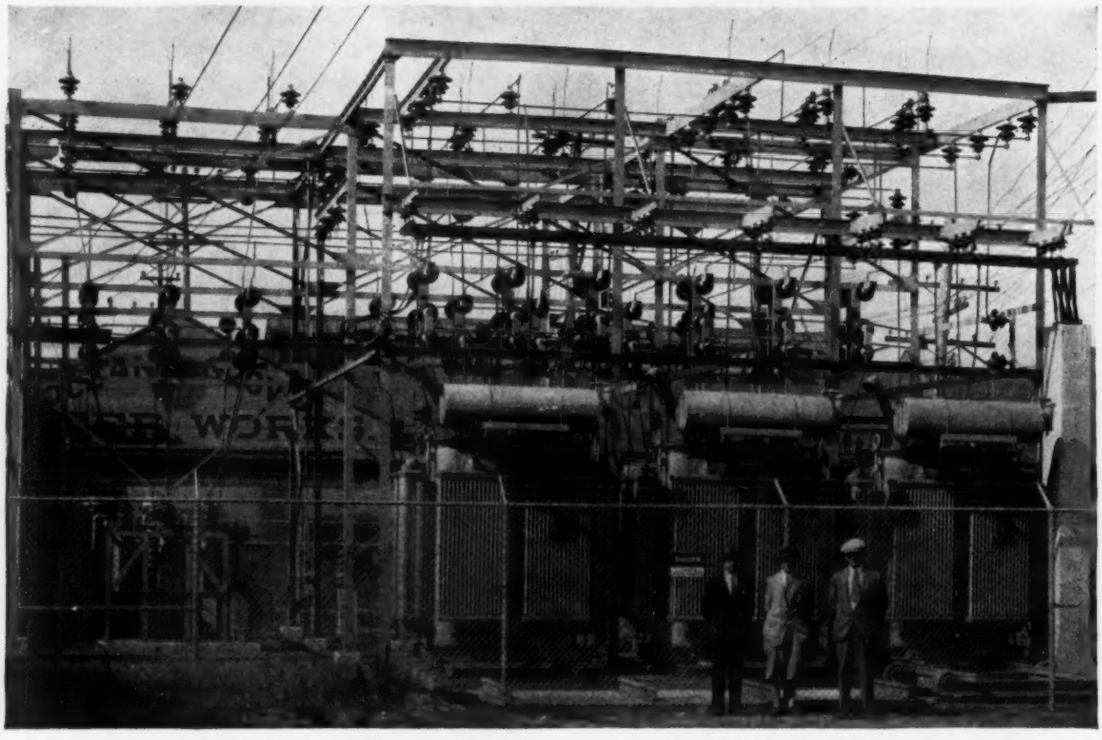
UNIT TYPE IN NEW JERSEY



33 K.V.-6000 K.V.A. Bradley Beach, N. J., Substation. Eastern New Jersey Power Company

Back of Unit Type is Our 750,000-Volt Laboratory

THIS substation is owned by the Eastern New Jersey Power Company, Asbury Park, N. J., one of the properties controlled by the Utilities Power & Light Corporation of Chicago.

The 6000 K.V.A. 33000/2300-volt transformers furnish 2300-volt service for distribution in Allenhurst, Asbury Park, Bradley Beach and Ocean Grove. There are three 33 K.V. lines, and provision is made for a future line.

The main and auxiliary bus, together with spare oil circuit breaker equipment permits any oil breaker to be released from service for inspection or adjustment.

Owing to salt air and heavy fog conditions which occur on the Atlantic Coast, it was deemed advisable to employ a higher value of insulation than is ordinarily provided for 33 K.V. construction. consequently this station was insulated throughout with 55 K.V. insulator units.

Disconnecting Switches

The gang operated disconnecting and air break switches are of the Unit Type "MA-39" and "MB-39" form. The disconnects for the oil breakers are group operated, the six pole combination being controlled by one operating mechanism.

This substation was designed by engineers of the Utilities Power & Light Corporation. The high tension switching and bus support equipment was furnished by Delta-Star.

DELTA STAR ELECTRIC CO. CHICAGO

Have You a Copy of our New Bulletin 32-B

Unit Type Equipment Shipped Assembled Ready for Use

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Electrical World

Published by McGraw-Hill Publishing Company, Inc.
W. H. ONKEN, JR.
Editor

VOLUME 70 — *New York, Saturday, September 17, 1927* — NUMBER 12

Where Do Power Salesmen Keep Their Selling Data?

RECENT surveys of electrical applications in industry in six states brought out the existence of a surprising paucity of data in power-sales engineering files when details of motor drives, illumination and industrial heating installations were sought. The curtain might as well be drawn over the scene when desks were emptied, folders scanned and engineers' notebooks thumbed in the endeavor to resurrect the economic data upon which certain installations were sold in competition with other sources of energy supply.

Application data on various processes should be of help in giving prospective customers advice regarding their new applications. How, indeed, can new business be obtained promptly if economic data on results achieved with electric operation are not available on local enterprises? If "it is never too late to mend," it is certainly time to start working on the important job of compiling as complete information as possible upon ratings and performance of industrial equipment supplied by central-station service. Preoccupation with new-business development should not allow the regular contacts essential to the best relations between power engineers and their customers to pass without a steady accretion for utility file service of data based on field surveys kept up to date. A few customers hoard such information, but on the whole the entrée of the power sales engineer into industry is to be envied, and it should be capitalized in detailed accurate technical and economic records upon which he and his successors may build future business from this time forth. A commercial department needs operating data on its customers' processes just as much as the engineering department needs to keep plant operating records.

* * * *

Decreasing Use of Direct Current

THE forty-third annual meeting of the Association of Edison Illuminating Companies serves as a reminder of the importance of the metropolitan systems represented in that body, and also of the minor position which direct current now holds in American electric light and power practice. Of course, the Edison association has changed with the art and discusses advanced and weighty matters of engineering involving alternating current as well as direct current. Not that direct current has ceased to give satisfaction—for in many respects it is far superior to alternating current—but because alternating current, owing to its greater flexibility of transformation and transmission, has found wider application and greater use.

Thus there is presented a notable example of a simple and efficient system of electric generation and distribution being displaced by a more complicated but more flexible and economically useful system which has now become standard American as well as European central-station practice. Even in isolated plant and industrial work where direct current is preferable, the influence of alternating-current standardization has served to weaken the hold of the older system. With approximately 96 per cent of electric central-station output alternating-current and the preponderance of electric motors in industry also alternating-current, the time is probably not far distant when much direct-current apparatus will become special and the alternating-current system consequently will become dominant.

* * * *

State Conventions and Their Helpfulness

SEPTEMBER is the month of many conventions—this year abroad as well as here. There are many who question the desirability of annual meetings and who often go so far as to insist they serve no useful purpose. Obviously, such persons need enlightenment. However, what one gets out of such stated gatherings may be much or little, depending on the programs, and it is with respect to program that many meetings lack originality and interest.

For example, it is expected that at a national convention of an organization possessing local, state or geographical divisions only matters of national importance will be presented, and these in a clear, concise manner with an air of finality and with little discussion. The place to thrash out and discuss as well as to originate papers on practice and experience is in the local and state bodies, whence the subject passes for further condensation and refinement to the geographic division. Then by the time it reaches the national body all dross is winnowed away, and there remains an agreed-upon and accepted standard practice, or code of ethics, or public policy, which has come up from below and not been handed down from above.

To a local or state body there is nothing more important than a free and frank discussion of local problems by local men who are facing and solving them. National questions are rarely so acute, and they may be left to the national organization. Therefore a state body which holds a miniature national meeting and neglects consideration of problems nearer home, or whose committees fail to contribute original material and experience to national committees, is neglecting its opportunities. It will be a sad day for any industry when its sources of information dry up. We would therefore urge upon local committees not to follow the path of least resistance and rehash the work already done by national

committees, but to make some definite contribution to the literature and experience of the art. Likewise, state bodies should seek out and encourage intimate discussion of state problems and build up a strong geographical organization capable of giving sustenance to the national body rather than merely absorbing strength from it. Then state and geographical conventions will not lack executive support.

* * * *

The Coming Joint Industry Sales Conference

UNLESS all signs of preparation fail, the electrical industry is about to embark upon the most ambitious market-building project so far conceived. In the report of the recent industry conference on wiring it was agreed by all that the inadequacy of present house-wiring installations interposes a baffling barrier to the sale of electrical equipment and that present conditions in the contracting trade give little promise of bettering the situation. Clearly it is an industry problem and something must be done about it. So the wiring conference in its report recommended the calling of a new joint conference—an industry sales conference—and the National Electric Light Association, the National Electrical Manufacturers' Association, the Electrical Supply Jobbers' Association and the Association of Electragists International have voted the appointment of delegations to represent these four major branches of the industry, each consisting of five outstanding sales-minded executives. These men, together with representatives of other smaller interested groups, are to meet at the call of the chairman of the wiring conference, elect their own chairman and proceed to work. What will they undertake to do?

With sixteen million homes in America, most of them inadequately wired, and with the wiring of houses in the hands of thirty thousand contractors of whom only twenty-three hundred are nationally organized, the needs of the situation are obvious. The industry must set up a broad embracive sales program—a five-year program, at least, backed with an appropriation of not less than a million dollars a year and supported by the man power of the entire industry directed under a well co-ordinated plan. For the way must be found to rewire present connected houses for complete equipment and to establish a practice of adequately wiring new houses. And to accomplish this will require the organization of the contracting trade so that these 30,000 men who do the industry's wiring may be guided and educated to a better performance. It will require the promotion of uniformity in inspection, a further development of league work, the establishment of acceptable standards of merchandising for the electrical appliance trade, and a two-fisted campaign of popular advertising both national and local. It is a selling job. The houses must be adequately wired, refixtured and then equipped with appliances—not some day, but now.

There has never been an issue before the industry that has had such universal appeal. Such a program, successfully carried out, will develop a tremendous market for wiring materials, fixtures, appliances, small motors and all the meters, lines, transformers and station equipment that will be required to carry the added load. Power companies, manufacturers, jobbers, contractors and dealers naturally all are for it. The opportunity stares the industry in the face. All it needs is wise planning and courage to spend money to unloose this waiting business.

Electric Discharges for Petroleum Production

MANY manifestations of the potency of electricity in industrial production processes have been had and the end is not yet. A threshold type of experiment with numerous industrial possibilities was recently described before the American Electrochemical Society by Drs. Lind and Glockler. Previous experiments of Dr. Lind with radon emanations acting on ethane or other hydrocarbon gases showed that ionization resulted, one part of which brought about condensation and the formation of an oil. He then conceived the possibility of applying silent electrical discharges to the gases in the hope that similar results would occur. In the experiments made electric fields were used instead of radioactive materials, and the results were very indicative of the occurrence of similar reactions. It is a far cry from these experiments to their commercial application, but a threshold experiment of this type will be carried much further under economic urge.

* * * *

Impressions of the Meetings of the Commercial Section

IT IS apparent to any close observer that a very healthful change has come over the work of the N.E.L.A. Commercial Section. It was never more striking than in the section meetings that were held last week in Chicago. For not so long ago the chief product of the Commercial Section was a stack of printed reports with which those who attended the convention each year were loaded down as soon as they arrived at the meeting, with no time or inclination to read. Today the fifteen committees that compose the section are intent on programs that promise direct progress in the commercial advancement of the power industry. This work may or may not entail the publication of information, but the chief purpose is to go forward with the development of the market—lead where it may.

The immediate major objective that stood out preeminently in the meetings last week was the necessity for the development of residence load, and here interest centers on two factors. The inadequacy of present house wiring must be overcome and the relations of the power companies with all other retailers must be improved so that appliances will flow more rapidly into the homes. The wiring committee has been reorganized so that it will no longer make its chief interest the standardization and code aspects of wiring equipment but will direct its energies to stimulating the sale of wiring. With this in view, action was taken toward the committee's participation in the coming industry sales conference that is to set up an industry program to the same end. The merchandising committee, which last year brought about the first official contact between the N.E.L.A. and several other associations representing retailers who include electrical appliances in their merchandise, announced plans for a further conference with all interested trades to the end that standards of merchandising practice may be developed that will be a guide to all and put an end to obstruction and lack of harmony in the local market. An expression of both these purposes is embodied in the prize campaign announced at the Atlantic City convention in which $10,000 will be won by the companies showing the greatest increase in average consumption per residence in

1928. Meanwhile the other committees are working ahead on light, heat and power applications, with active interest in refrigeration, ranges, water heaters and promotional rates, and a new committee is to be formed to study oil burners.

Because of the competition of the series of geographic section conventions now running, attendance was a little disappointing, and the fact that the next meeting is set for March would seem to risk a slow start for the year's program. The work has become so much broader than in past years, and the expectations of the industry are so great, that, despite the burden it entails, intermediate meetings of individual committees become particularly important, to speed still further, if possible, the building of the market.

* * * *

Trends in Hoisting Equipment for Mines

RECENT ore hoist installations in the Butte copper mines incorporate two important departures in design from established practice which promise greater economy and safer operation. In two recently completed installations the conventional induction motor-generator flywheel set has given way to a synchronous motor-driven generator for supplying the direct-current hoist motor. Elimination of the bulky flywheel was made possible partly by the fact that the mining company purchases such a large block of power that the effect of momentary high demands on individual pieces of equipment is not of great importance. The advantages of the synchronous motor-generator set over the induction-motor flywheel set, particularly its power-factor-correcting capability and smaller consumption of energy, are so great that it seems probable that future hoisting equipment design will tend strongly toward synchronous motor drive for the direct-current generator, irrespective of the advantages of the WR^2 of the flywheel.

A second feature of these hoists is the application of dynamic braking to the main direct-current hoist motor. In large hoist installations every possible precaution is taken to guard against accident due to overspeed, overtravel or other causes, and to this end numerous and elaborate safety devices have been used. Dynamic braking has now been added by the manufacturer to the list of safety features. It gives the mining man assurance that the hoist will not run away while lowering unbalanced.

* * * *

Sources and Benefits of Ultraviolet Radiation

DISCOVERIES in recent years pertaining to the effects of ultraviolet radiation promise to mankind another benefit through electrical development. Already enough is known of the marvels of this radiant energy—of shorter wave length than that which enables us to see—to cause further developments to be watched with much interest. As is always the case when a new art is still in the twilight zone of knowledge, many unproved claims are made by the ignorant and the dishonest. However, present knowledge is enough to awaken electrical interests to a new avenue of service.

The electric arcs are the only efficient sources of ultraviolet radiations of wave lengths that are now known to be exceptionally valuable. Inasmuch as these radiations are not appreciably transmitted by ordinary glass, quartz has been used where any medium is necessary; but efficient special glasses are bound to be developed. The various carbon arcs need no confining transparent medium; therefore they can be used bare. The quartz-mercury arc is more convenient because replacement of electrodes is not necessary. Therapists still differ in regard to the relative merits of the various electric arcs; but at least these are the only sources to be considered at present for ultraviolet therapy and most other uses.

Effective sources of ultraviolet radiation of proper wave lengths will be improved, and when they are inexpensive and safe to use the public will install them in home, office and factory. By going indoors man has reduced his exposure to certain invisible radiations from the sun which are now known to be beneficial and even essential. But electricity will furnish these and radiations of still shorter wave length which do not reach the earth's surface from the sun. Thus man's knowledge is replacing a valuable factor of outdoor environment which he could not bring indoors; and doubtless he will improve upon his natural environment in this respect as he has done in so many other phases of his life and work. When the vitamin was introduced to us it seemed a far cry from it to electrical development. Today ultraviolet radiations produced by electric arcs are very closely related to vitamins.

* * * *

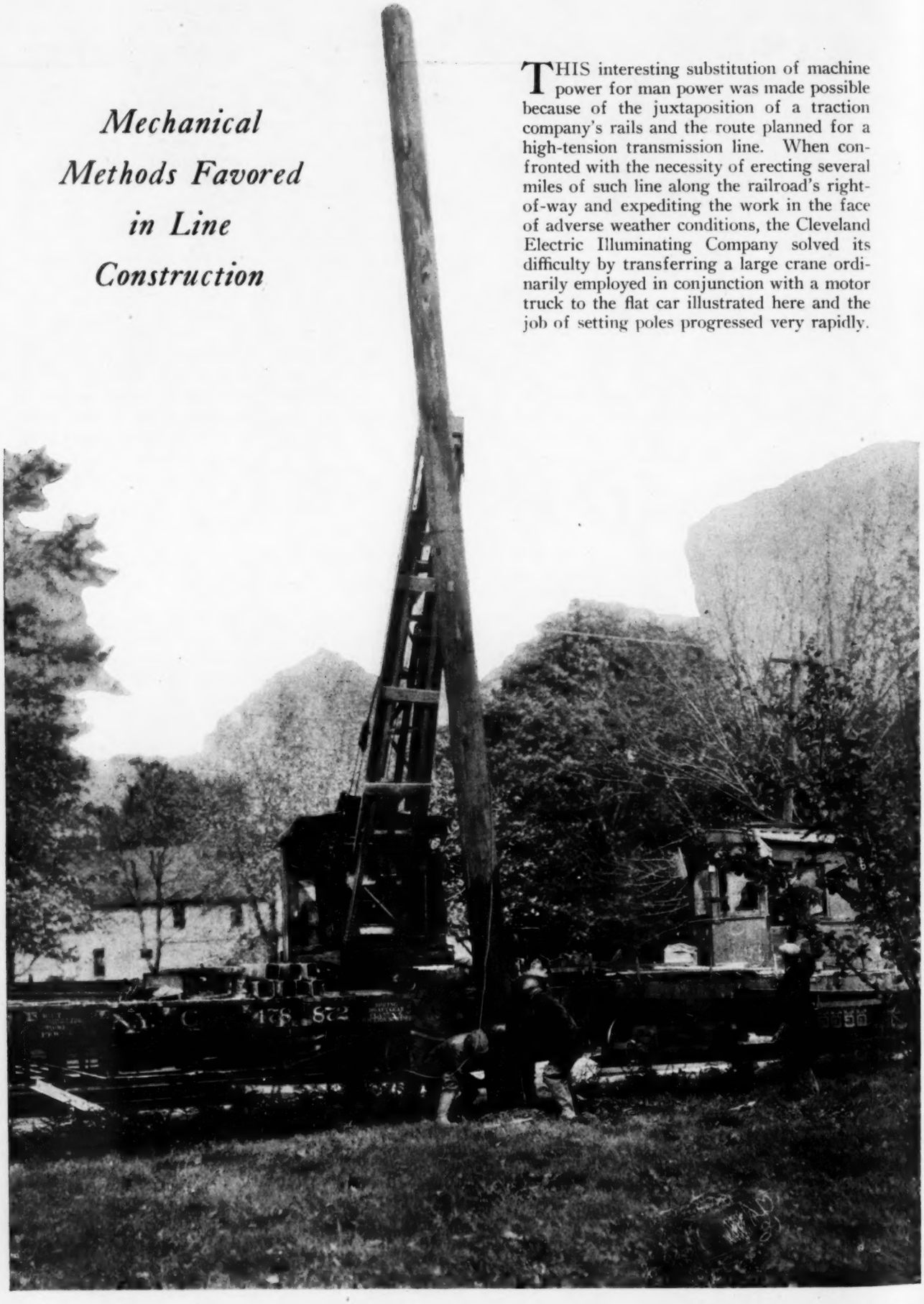
Fragmentary Nature of Data on Private Power Plants

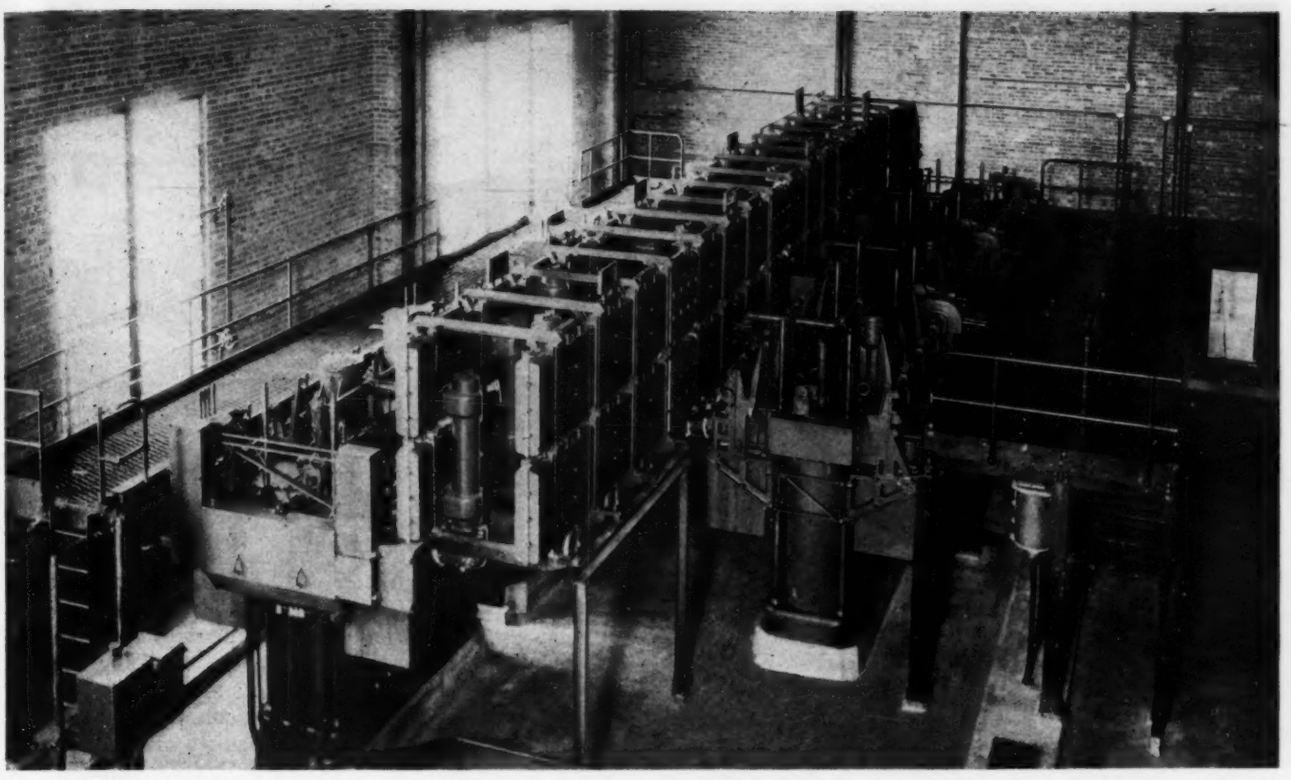
IN A COMMERCIAL sense the electrical energy used in the United States comes from two main sources—public service plants, selling energy for residential and commercial lighting and for a myriad form of power application, and private plants, generating energy usually for a particular mill, factory, hotel, mine or other establishment. Very complete data for the first group are currently collected. But on the second type, the private plant, information is fragmentary. Even the Department of Commerce has never succeeded in including it in the census. The picture of electrical energy consumption is therefore seriously incomplete. An important element in the potential field for central-station supply is not definitely known. In the United States Census of Manufactures for 1925 a start was made by getting data on the rating of generators in manufacturing plants. But that is merely a beginning, because many private electrical plants are not connected with manufacturers.

A special effort is now being made by the Census Bureau to obtain and publish statistics on private plants similar to those issued at five-year intervals for the electric light and power industry. It is a large task. The first step is the compilation of a complete mailing list. No one is better able to supply the necessary names than the electric utility companies, each for its particular territory. To them the bureau has recently sent requests soliciting their assistance toward that end. It is to be hoped, both as a matter of co-operation in collecting data of national importance and as an act of intelligent self-interest, that a prompt and full response will be accorded to these requests. Washington has complete lists of the public utility companies and compiles data regarding them. The information on private sources of power supply ought to be equally complete. It can be made so if utilities will co-operate. The bureau is doing its part.

Mechanical Methods Favored in Line Construction

THIS interesting substitution of machine power for man power was made possible because of the juxtaposition of a traction company's rails and the route planned for a high-tension transmission line. When confronted with the necessity of erecting several miles of such line along the railroad's right-of-way and expediting the work in the face of adverse weather conditions, the Cleveland Electric Illuminating Company solved its difficulty by transferring a large crane ordinarily employed in conjunction with a motor truck to the flat car illustrated here and the job of setting poles progressed very rapidly.





12,000-VOLT ARMORED SWITCHING STRUCTURES

Armored Switchgear

for Main and Auxiliary Station Buses

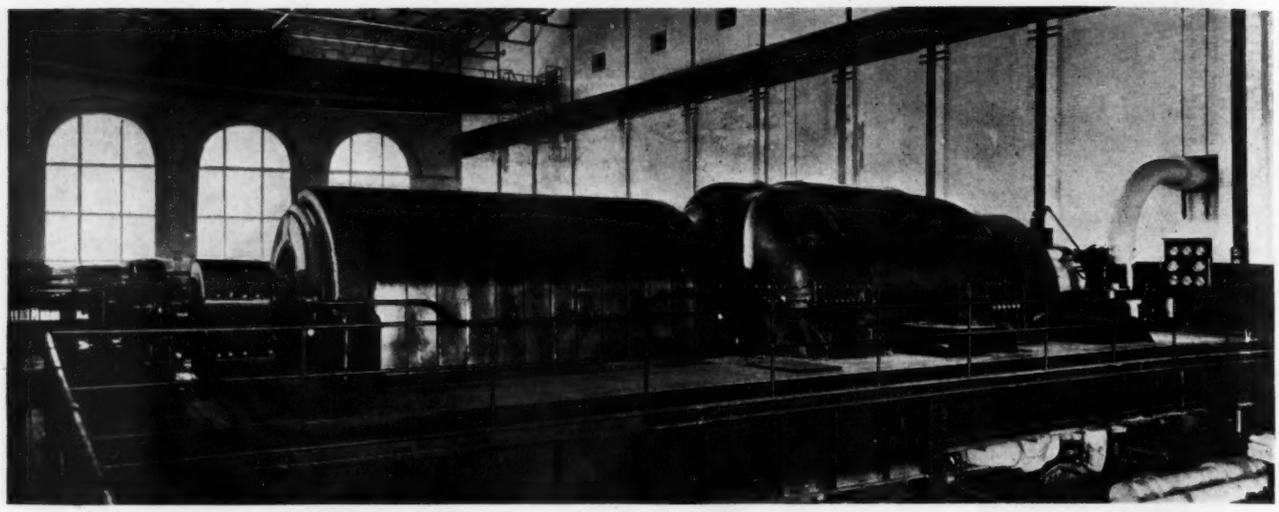
50,000-kw. addition to plant of the Public Service Company of Northern Illinois also includes tandem compound turbine and 600-lb. throttle steam pressure. Auxiliaries are served from main bus. Across-the-line starting on large motors

THERE are several points of difference in the latest addition to the Waukegan plant of the Public Service Company of Northern Illinois that set it apart from usual American practice. The principal difference is in the use of Allis-Chalmers Reyrolle switchgear for both main and auxiliary buses. Other less striking differences include the use of steam at 600 lb. pressure, the use of preheated air at the furnaces, the closed system of ventilation of the generator with air circulation by independent motor-driven fans, the use of 2,300-volt motor-driven auxiliaries starting on full voltage and armored cables for all auxiliary services.

Seven panels or units of type M metal-clad switchgear with double-deck, twin-main and reserve-metal-clad busbars constitute the 12-kv. main bus installation. This is claimed to be the first installation of this type of switchgear in a generating station in the United States, and the main switches are reported to be the largest of their kind in the world. The switch panels or units are arranged in two parallel rows with the busbars in parallel rows above but between the switch rows. Although a reserve busbar is provided, largely as a means of connection between the switch structures previously installed and those expected to be installed in the future, the switchgear provides but one switch on each circuit, as is shown in the accompanying drawing. Excepting, of course, the bus-sectionalizing switches, the switches are arranged for connection to either busbar by means of selector disconnecting switches.

The switch panels for the main services are rated at 3,000 amp. (30 deg. C. rise), 12,000 volts, with an interrupting capacity of 1,500,000 kva. The switch panels for the auxiliary transformer circuits, rated at 600-amp. capacity, differ from the larger switches only in the sizes of the current conductors and contact surfaces. Each switch panel with its complement of the busbars weighs about 24 tons and occupies a space approximately 12x14 ft., 14 ft. high.

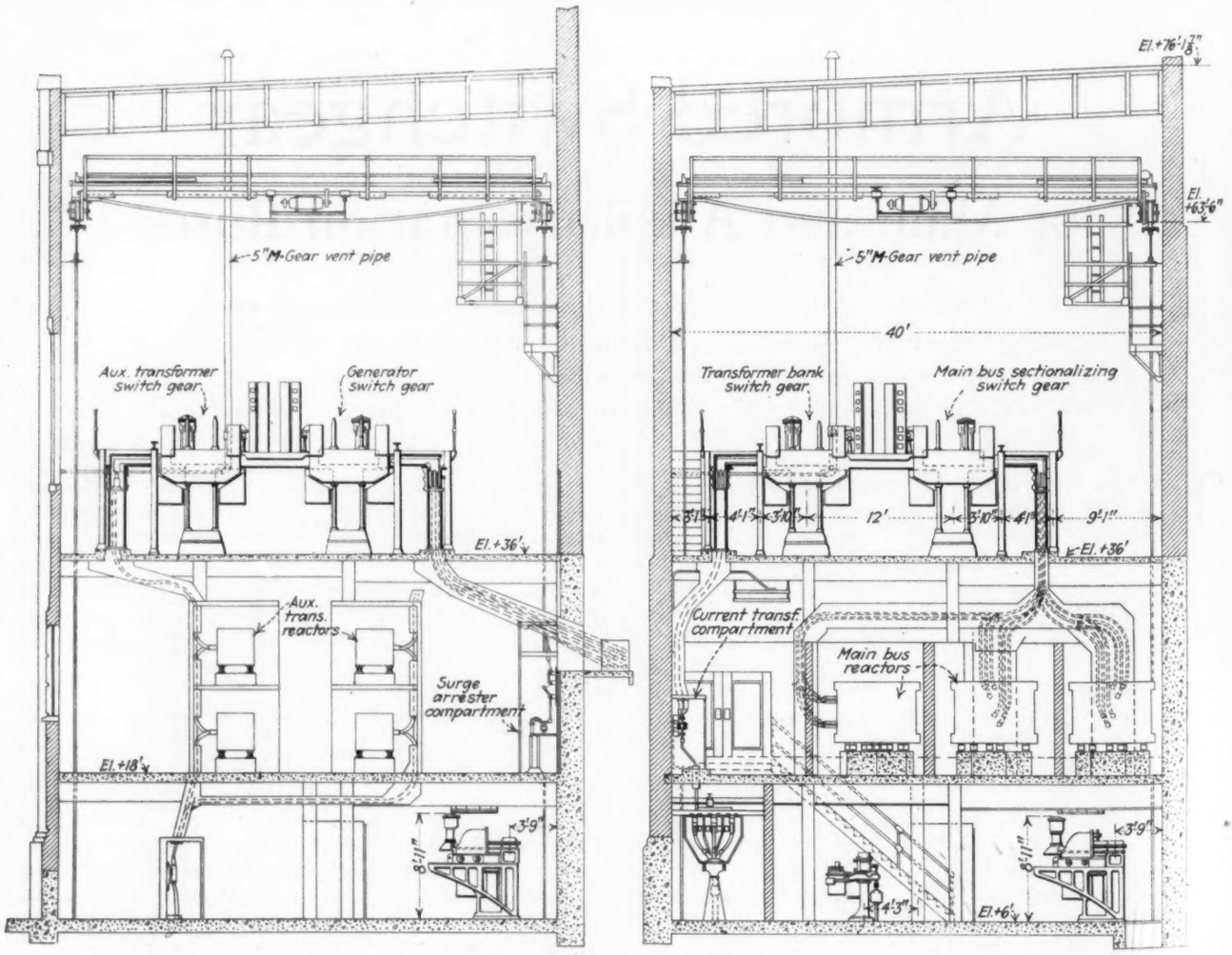
Each switch panel is a complete unit from the busbars to the connecting cables, with all live parts metal clad.



50,000-KW. UNIT JUST ADDED TO WAUKEGAN STATION

The busbar disconnecting switches, main and arcing contacts, cable disconnecting and grounding switches and the current and potential transformers are immersed in oil. The busbars and the fixed conductors in the switch panel are buried in insulating compound. Complete separation of the phases is maintained throughout the whole equipment. At all points adjacent phases are separated by portions of the grounded metal inclosing structure.

In general, a switch panel may be described as consisting of three main single-phase switch tanks, resting on a common bedplate, surmounted by a massive common top plate, with disconnecting switch tanks on both sides of the main tanks and with the necessary trunks for the connections to the busbars on one side and to the outgoing or incoming cables on the other side. A fixed portion of the panel is supported by brackets attached to

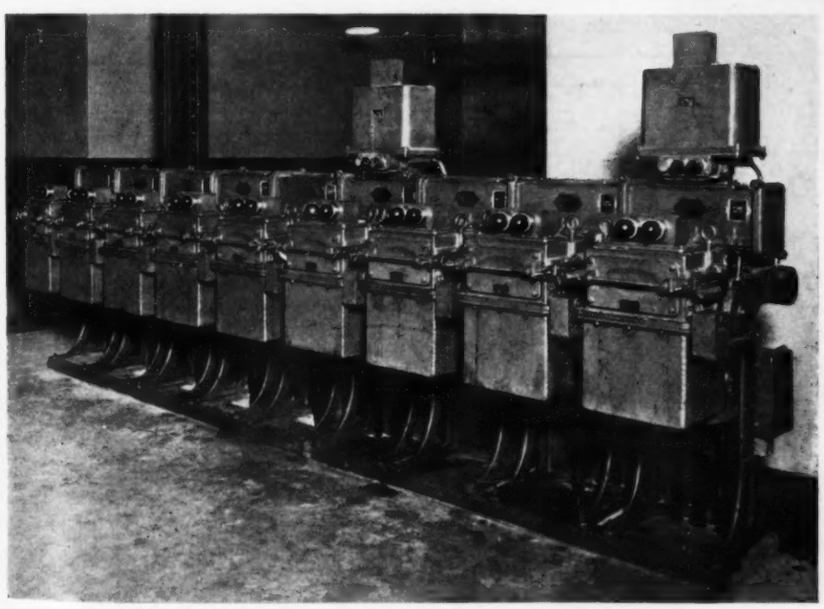


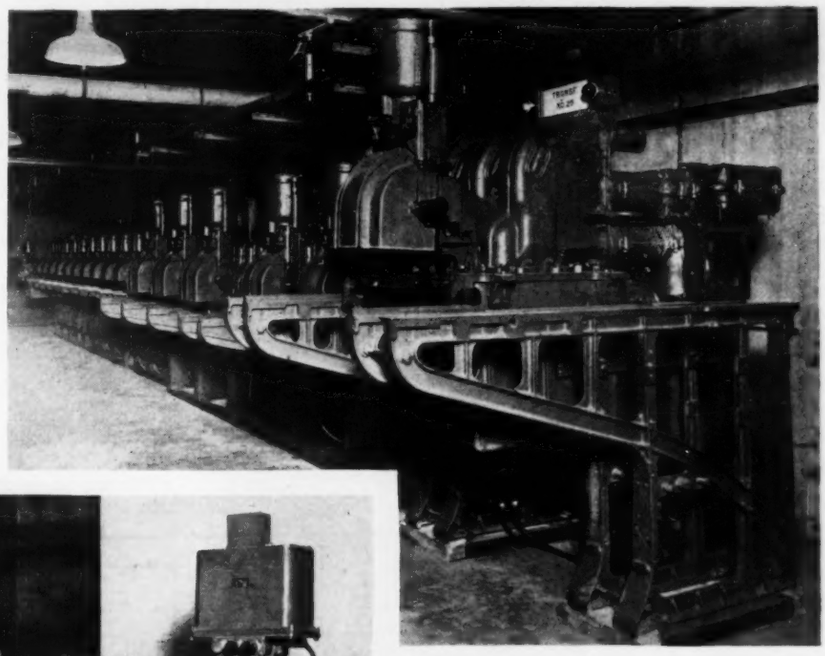
ARMORED SWITCHGEAR SIMPLIFIES STATION LAYOUT

posts mounted upon the bedplate. The main and arcing contacts and mechanism of the three phases, and one pole of each of the disconnecting switches, are supported from the common top plate, which also carries the operating mechanism of the main switch. Inspection of the contacts is permitted by withdrawing, vertically, the complete top plate with its attached fittings. Removal is effected by means of a traveling crane. A skeleton panel structure is provided upon which the removable portion may be placed for inspection and test operations. Inspection of the disconnecting switches and of the current and potential transformers may be made by lowering the side tanks.

Each switch panel is mechanically interlocked so that all the operations of the disconnecting and grounding switches can be made only in established sequence and so that no live parts may be exposed at any time. The group of switch panels are also electrically interlocked so that no busbar connections at the selector disconnecting switches may be exposed while the corresponding busbar is live. The switch panels are also interlocked with the traveling crane so that hoisting operations can be performed only when the crane hook is immediately over the particular panel involved and then only providing the main switch and all the necessary disconnecting switches are open.

The 2,400-volt and 480-volt auxiliary switching structures are also Allis-Chalmers Reyrolle. These structures are made up of switch panels or units of the A, B, C and E types. These switch panels are of the horizontal draw-out type with air break, plug and receptacle type disconnecting switches. When the switches are drawn out, automatically operated doors effectively prevent access to the busbar disconnecting switch receptacles. Access to the main contacts is obtained by lowering the switch tanks.





SWITCHING STRUCTURES FOR 480-VOLT AND 2,300-VOLT (TOP) AUXILIARIES

In the selection of the switchgear for this installation, and especially in the selection of the main switchgear, paramount consideration was given to the following features:

The highest possible degree of safety.

Large interrupting capacity with complete separation of the phases.

Elimination of possible human error in the sequence of switching operations.

Reliability.

All of these features are combined in the type M equipment to the highest degree yet attained in any switchgear in general service and to a very high degree in the switchgear of the other types, according to engineers of the Public Service Company. While it might appear that such an installation would be rather expensive due to the fact that the cost of such equipment is of course higher than that of comparable equipment of the usual type, a considerable saving was effected in other parts of the installation due to the elimination of switch cells, simplification of building requirements and simplicity of installation.

The new generating unit is an Allis-Chalmers reaction type, two-cylinder tandem-compound steam turbine, connected to a single generator with direct-connected exciter. The unit is rated at 50,000 kw. at 85 per cent power factor, or 58,825 kva., and runs at a speed of 1,800 r.p.m. The turbine takes steam at 600 lb. pressure at a temperature of 725 deg. F. and exhausts into a vacuum of 29 in. of mercury. The condenser is of the surface type with a total condensing surface of 57,000 sq.ft. The air circulation for the ventilation of the generator is produced by two No. 8 American high-speed fans (160,000 cu.ft. per minute) direct connected to induction motors. Cooling of the air is effected by means of a U-fin generator air cooler, located in the air discharge duct between the generator and the fans.

The principal boiler room equipment with the new unit consists of four Babcock & Wilcox boilers equipped with chain-grate stokers, economizers, forced and induced draft fan equipment, feed-water heaters and deaërators. Each boiler has a total heating surface of 14,369 sq.ft. and an effective grate surface of approximately 467 sq.ft. Each boiler unit is designed to evaporate, as a maximum, 200,000 lb. of water per hour from the temperature of the feed to a steam pressure of 635 lb. per square inch. Air is delivered to the furnaces at about 350 deg. F.

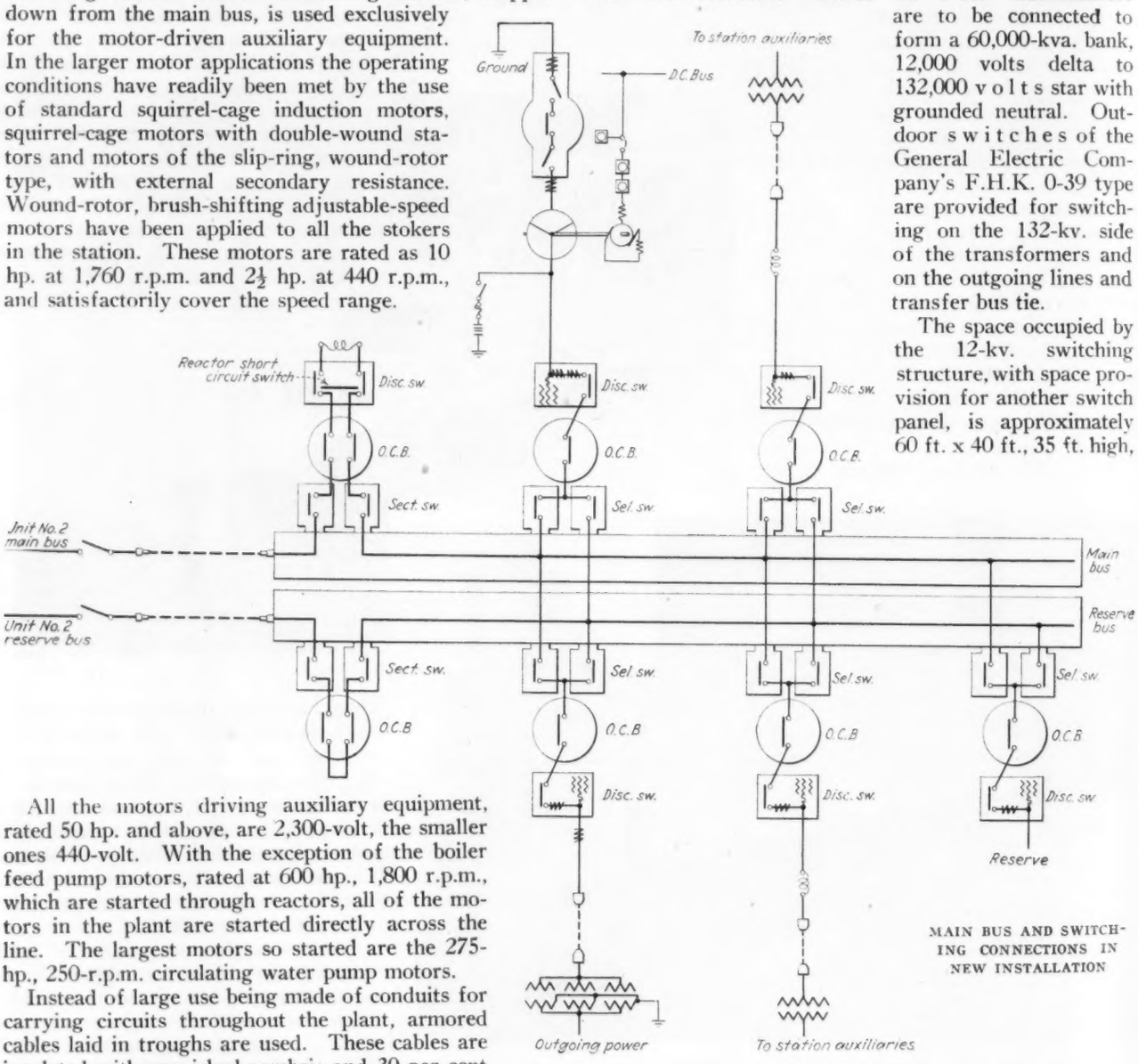
Throughout the station alternating current, stepped down from the main bus, is used exclusively for the motor-driven auxiliary equipment. In the larger motor applications the operating conditions have readily been met by the use of standard squirrel-cage induction motors, squirrel-cage motors with double-wound stators and motors of the slip-ring, wound-rotor type, with external secondary resistance. Wound-rotor, brush-shifting adjustable-speed motors have been applied to all the stokers in the station. These motors are rated as 10 hp. at 1,760 r.p.m. and 2½ hp. at 440 r.p.m., and satisfactorily cover the speed range.

All the motors driving auxiliary equipment, rated 50 hp. and above, are 2,300-volt, the smaller ones 440-volt. With the exception of the boiler feed pump motors, rated at 600 hp., 1,800 r.p.m., which are started through reactors, all of the motors in the plant are started directly across the line. The largest motors so started are the 275-hp., 250-r.p.m. circulating water pump motors.

Instead of large use being made of conduits for carrying circuits throughout the plant, armored cables laid in troughs are used. These cables are insulated with varnished cambric and 30 per cent Hevea rubber and braided or lead covered according to the services and location, then closely wrapped with two layers of steel tape. They range in size from three-conductor 600,000 circ.mil to two-conductor control wire. The use of armored cable in this manner eliminates many of the otherwise necessary conduits, the disposition and installation of which, in the modern large generating station, has become a serious problem due to the large sizes and the numbers involved and the difficulties encountered in adapting them to the building constructions, the mechanical equipment, piping, etc.

The Waukegan plant is located on Lake Michigan about half way between Chicago and Milwaukee, and is an important link in the interconnection between the systems of those two cities. One large outdoor transformer and switching yard for the 132-kv. transmission line originating at this point is now in operation. The plans provide for ten lines, the immediate development providing for three lines and the necessary main and transfer buses and transfer bus tie-line. Four 20,000-kva. Westinghouse water-cooled transformers with facilities for changing voltage under load are installed. Three of these transformers are to be connected to form a 60,000-kva. bank, 12,000 volts delta to 132,000 volts star with grounded neutral. Outdoor switches of the General Electric Company's F.H.K. 0-39 type are provided for switching on the 132-kv. side of the transformers and on the outgoing lines and transfer bus tie.

The space occupied by the 12-kv. switching structure, with space provision for another switch panel, is approximately 60 ft. x 40 ft., 35 ft. high,



MAIN BUS AND SWITCHING CONNECTIONS IN NEW INSTALLATION

the height including the space required for the crane and the full-span roof trusses. The corresponding space that would be required for an installation similar to that for the preceding units, consisting of duplicate circuit beakers in cell structures with independent potential transformer cells, would be approximately 48 ft. x 40 ft., 19 ft. high, with center columns and dividing-span roof members, or 22 ft. high with full-span roof trusses. This construction does not provide a true form of segregated phases. The type M switchgear, having all phases independently incased in metal, is equivalent to phase segregation.

It is doubtful, the Public Service company declares, whether there is any segregated phase installation where comparative switching equipment is installed occupying less space than that required for the armor-clad switchgear. Phase insolation entails a divided building of special or peculiar construction, whereas only a simple building is required for the armor-clad switchgear installation.

The company also adds that the space requirements for the other types of switchgear, taken in groups, is about equal to that required for the more usual types of construction. A decided advantage in favor of the metal-clad switchgear is that the height required is not so great as for other types of construction, thus permitting installations being made in basements and stories of average height.

The metal-clad switchgear, being assembled in the shops of the manufacturer in composite units and "knocked down" only as required for transportation, lends itself readily to installation in the field. With few parts, mechanically prepared and fitted, reassembly is easily effected. The insulating and filling with compound of the section at the joints of the busbars and trunk connections and filling the tanks with oil are the only work of an electrical character required to prepare the structure for the cable and control wire connections. In the case of the switch panels or units for the auxiliary switching structures, several may be assembled and shipped together, thus greatly reducing the field work of aligning the units and making up the busbar joints. The frames and stationary parts, including the busbars, for a group of three units of the type B, for a group of four units of the type C, for a group of five units of the type E were successfully transported and installed. The draw-out portions were, of course, shipped separately, only requiring to be "elevated" and "racked" into position to complete the units. Compared to the assembly of the enormous number of widely diversified parts that go to make up switch structures of more usual construction, and especially where cell construction is involved, the assembly of the metal-clad switchgear is a simple and rapid process. Not only in reducing the great expense for field work does this feature produce favorable results; but also in the fact that the interest on the capital investment in the prepared building during the construction period can be materially decreased.

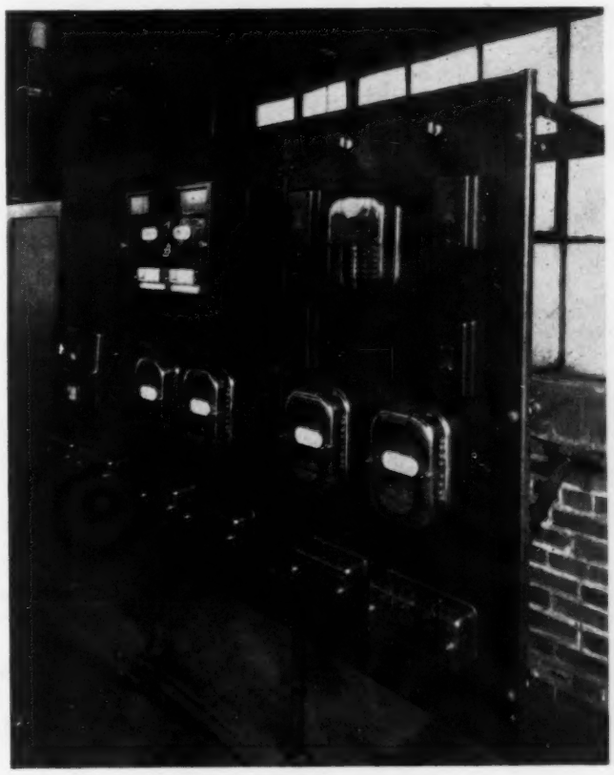
Tidd Emphasizes Foresight as a Major Responsibility

ELECTRICALLY we must always be in advance of the communities we serve, declares George N. Tidd, president American Gas & Electric Company. We cannot afford to let one of them catch up or pass us—nor can they. We must see city growth years before it takes place and must begin raising new capital to carry out plans which will not yield profits for two years or more. When the new industry comes, our power must be ready. We cannot say: "Yes, we will start construction now, and in a year or two your new industry can get power." We must say: "Yes, we foresaw the growth of this city; two years ago we made our plans for this very contingency, and today your power is ready." Only by constant vigilance, by constant study, by constant planning, can we always be ready with power at low cost. Interconnection has done more than any one element to permit us to keep ahead of city growth without undue cost.

Metering Customers Having Multiple Feed

By G. G. Waite
Supply Engineer Westinghouse Electric & Manufacturing Company

AN ACCURATE, simplified method of load totalization for billing large power customers who receive their supply over several feeders has been developed, and one installation of the apparatus on the Erie County Electric Company's system is shown. The totalizing system consists essentially of a master demand meter operated through impulses generated by watt-hour meters connected to the feeders being totalized. Each impulse represents a definite number of watt-minutes and the number of impulses per minute represent watts. Therefore, as the pen and dials of the master meter are moved

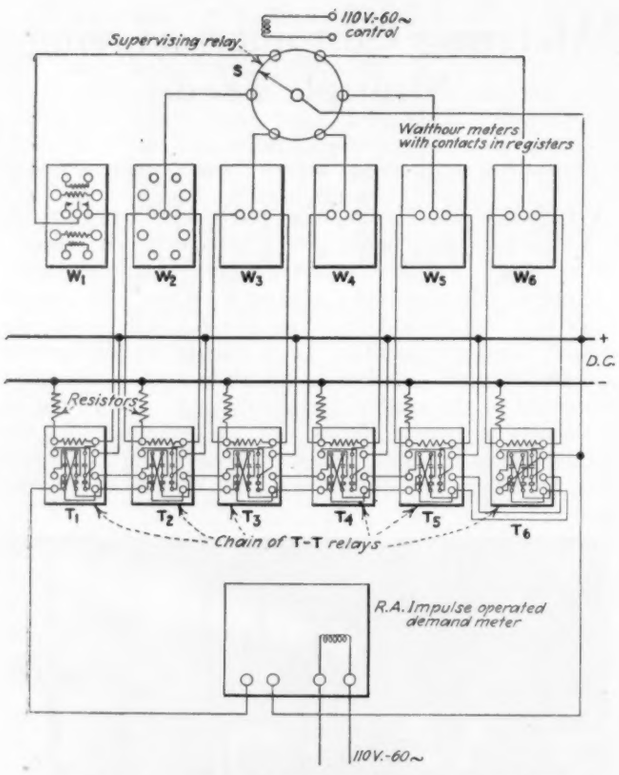


METER RECORDING TOTAL KILOWATT-HOURS AND TOTALED DEMAND FOR SEVERAL METERS

forward a definite amount by each impulse and as the pen is reset to zero at definite time intervals by a clock in the meter, the dials record the total kilowatt-hours and the chart shows the total demand for each interval. The peak may thus be determined from a single chart.

The success of this new method for totalizing the impulses lies in not permitting the master meter to lose impulses or to record false ones. In this system all the impulses are recorded and totalized regardless of the order in which they occur or the fact that impulses may originate simultaneously in all the meters.

The operation of the equipment is relatively simple. With a load on a watt-hour meter contacts close in the register and then open to close on another set in the same register. Contact on one set causes the positive side of the line to be connected through the supervising relay to the closing coil of an individual relay. The latter



SCHEMATIC DIAGRAM OF TOTALIZING METER EQUIPMENT

In the schematic diagram W_1, W_2, W_3, etc., represent watt-hour meters equipped with contact devices in their registers. T_1, T_2, T_3, etc., represent the chain of relays, one for each meter being totalized. *S* indicates the supervising relay continuously driven by a small induction motor. *RA* represents the master meter, which shows the total kilowatt-hours and the simultaneous demand of the feeders being metered.

will retain its position until unlocked. When the contact in the watt-hour meter closes on the other side, the supervising relay will again connect the positive side of the line to the individual relay, but this time to the other terminal of the closing coil. As both terminals on the operating coil will now be at the same potential, the relay will drop out and will remain down until its corresponding watt-hour meter causes it to repeat the cycle of operation.

It is evident that each of the relays reproduces the action of its watt-hour meter. Because of the action of the supervising relay, but one of the relays in the chain can operate at one time. As shown in the wiring diagram, the connections of the four lower terminals of the individual relays are such that a circuit is established and broken through the chain for each impulse. As the operating coil of the master meter is connected in this circuit, the desired record of the number of impulses produced by the watt-hour meter is made. It is necessary, to produce correct registration, that the supervising relay closes its contacts more often than the contacts in any of the watt-hour meters are closed.

Stoker Performance and Cost Data

LOW repair costs and increased efficiency in boiler operations were indicated by a survey* of the Riley underfeed stoker installation at the plant of the Stamford Gas & Electric Company, Stamford, Conn. Records of plant operation for the years 1925 and 1926 indicate a factor of evaporation of 1.14 and equivalent evaporation of 10.7 to 12.0 lb. of water per pound of coal.

As the boilers at this station supply steam for power generation and for process use in the gas plant—giving a joint production of saturated and superheated steam—boiler efficiencies are difficult to calculate accurately, but the estimated efficiency range is from 70 to 79 per cent. Average boiler efficiency for the period is approximately 77 per cent. About 10 per cent of the steam is withdrawn ahead of the superheaters and supplied to the gas works at 200 lb. gage, dry saturated.

The six stokers are of the eight-retort type and serve six 600-hp. Babcock & Wilcox boilers, which are baffled vertically to give three passes. The heating value of the coal as fired was about 14,500 B.t.u. per pound. Flue gases leave the boilers at 435 to 475 deg. F. and the CO_2 content is regularly held between 12 and 14 per cent.

One stoker, completely overhauled in October, 1926, has operated continuously for six months with no attention other than oilings, according to this survey. Four or five months' service with only minor repairs is customary.

Flexibility has been an outstanding feature of the stoker operation. It has been found that a stoker can be brought up from a banked condition to 300 per cent of rated load in a few minutes. Boilers entirely without fire may be cut into the line with full 200 lb. pressure 25 minutes after the fire has been started.

*Prepared by the A. C. Nielsen Company, Collaborating with W. M. Vaughn, chief engineer Stamford Gas & Electric Company.

Cost of Operating Six Eight-Retort Riley Underfeed Stokers

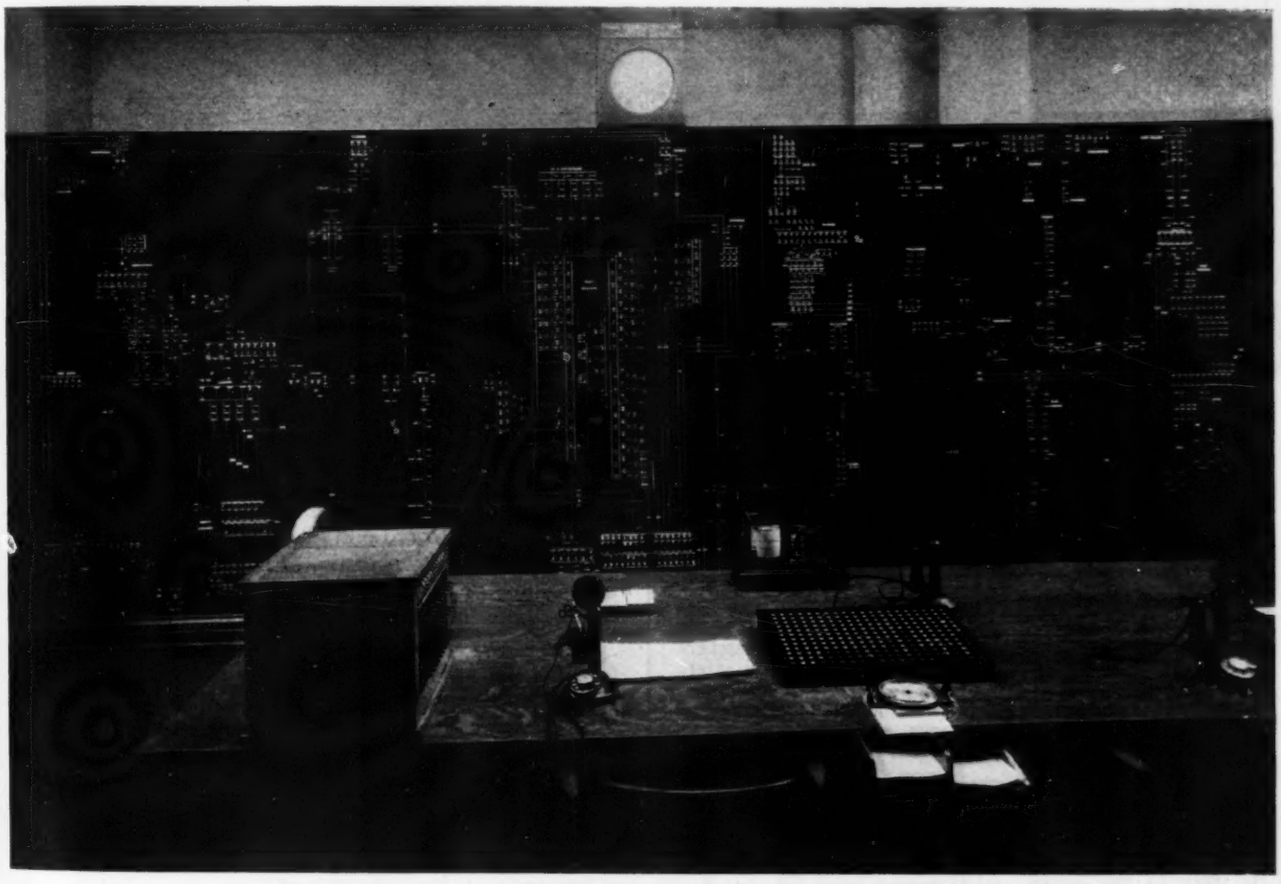
Annual Charges:		
Depreciation: $24,054 (installed) + 15-yr. life	$1,603.60	
*Average interest at 6 per cent: 16/15 × $24,054 × 0.06/2	769.73	
†Repairs to stokers and stoker engines: Labor and materials, average 1925-6 records	3,392.19	
Steam to stoker engines: Metered annual average charged at 7.5 per cent of actual cost due to reclamation of heat in feed water, 6,844,000 lb. at $0.36 per M × 0.075	184.79	
Lubrication: Oil: 60 gal. a yr. at $0.30 per gallon $18.00; Grease: 6 lb. a day × 365 days at $0.15 a pound 273.75	291.75	
Ash handling: Labor: 1 man × 8 hours × 365 hours at $0.35 per hour	1,606.00	
Firing labor: 1 fireman × 3 shifts × 8 hours × 365 days at $0.62 an hour	5,431.20	
Water tending and supervisory labor: 1 man × 3 shifts × 8 hours × 365 days at $0.68 an hour	5,956.80	
Total annual firing cost	$19,236.06	
Unit Firing Cost:		
Per equivalent ton of coal (1926), including total coal plus correction to coal-equivalent from heat value of tar and coke fired: $19,236.06 × 36,862 tons		$0.522
Per 1,000 lb. steam: Actual (flow meter totals for 1926): $19,236.06 ÷ 735,380,000 lb.		0.026
Equivalent (from and at 212 deg. F.): $19,236.06 ÷ (735,380 × 1.14) M. lb.		0.023
Coal and Firing Costs:		
Per year: Coal: 36,862 tons at $6 (approx.) $221,172.00; Firing above 19,236.06; Total $240,408.06		
Per 1,000 lb. steam: Actual (flow meter totals for 1926): $240,408.06 ÷ 735,380,000 lb.		0.327
Equivalent (from and at 212 deg. F.): $240,408.06 ÷ (735,380 × 1.14) M. lb.		0.287

*Allowing for interest earned by depreciation reserve.
†Average for 1925-26, but includes items ordinarily replaced at long intervals (cylinders, plungers and high-priced grate block).

Dispatchers' Facilities
for Supervising Operation of Widespread System

Features of new board, including manual and remote control of signals. Symbols for identifying voltage and apparatus. Communication and metering

By A. R. LEINBACH
Operating Engineer Metropolitan Edison Company, Reading, Pa.



MAIN DISPATCHING BOARD WITH SIGNAL CONTROLS AND TELEPHONE FACILITIES
Lights indicating position of disconnects are controlled manually.

A DISPATCHERS' board having some new features from the standpoints of appearance and utility has been constructed by the Metropolitan Edison Company at Reading, Pa., as a help to the system operators of the Pennsylvania-New Jersey power system* in providing more reliable and safe operation.

A line diagram type of board was decided upon and built, showing only major generating stations, the 114- and 66-kv. systems and such low-voltage lines as serve as possible ties between generating stations and the high-tension system, eliminating all strictly radial lines. This was made possible by the fact that local load dispatchers' offices are located at York, Reading, Easton and Dover for operation of local lines and distribution and for executing the system operator's orders on the high-tension lines.

The board proper is made of ebony asbestos, having a semi-gloss black finish, and is 24 ft. long by 8 ft. high,

*The system extends approximately 225 miles from Gettysburg, Pa., to Dover, N. J., with Reading very nearly at the load center. At Middletown, on the Susquehanna River, ten miles below Harrisburg and 50 miles west of Reading, is located the largest and most efficient steam plant, using pulverized coal and having installed at present one-third of its ultimate capacity of 225,000 kva. Fifteen miles south of Middletown is the York Haven hydro plant, feeding about 15,000 kw. into the system. A 75,000-kva. steam station is at Reading, and 50 miles east is the Easton plant, of 30,000-kw. capacity. At Holland, N. J., about fifteen miles south of Easton on the Delaware River, construction has been started on a plant which will be a duplicate of the one at Middletown.

consisting of 24 sections, 2 ft. x 4 ft. x ½ in. thick, mounted on tee and angle iron. This unit size was used so that any extensive changes required may be made on a new section and this be inserted in the proper place.

Manual and Automatic Lamp Signals

Red or green lights are provided for all switches to indicate whether they are in the open or closed position. One special feature is that both red and green indications are obtained through one clear lens. One lamp burning continuously furnishes the indicating light for the air-break disconnecting switches. It shines through semi-circular openings. The change from red to green, and vice versa, is accomplished by turning a small ring on the face of the board which moves semi-circular pieces of red or green celluloid over these openings.

Two lamps are provided for each oil switch, one furnishing the red and the other the green indication, making it necessary for only one lamp to be burning at a time. With the exception of a few stations this change from one lamp to the other is made by means of a bank of telephone switches located within easy reach of the operator. Certain stations in and near the city, however, are connected with the system operator's office by telephone cables, which are used to provide automatically indication of the oil circuit breaker positions on the dispatchers' board by means of auxiliary switches on the breakers.

A remote-control cable supervisory substation, soon to be put in service, will be operated by the local dispatcher. As some of the breakers in this station will be under the supervision of the system operator, provision is being made to have this equipment automatically operate a separate set of lamps connected in parallel with the local dispatchers' indicating lamps for such breakers on the system operator's board.

Gummed paper strips and letters are used to show the lines, generators and transformers, and line and switch numbers on the board, the color indicating the voltage according to the following legend: yellow, 114,000; orange, 66,000; red, 33,000; green, 13,200 and 11,000; blue, 2,300. Generators are shown by solid circles of a color corresponding to the generator voltage. Transformers are indicated by two half-circles, one half having the primary voltage color and the other half the secondary voltage color, while in between is inserted the number and size of single-phase units.

The local dispatching offices are all equipped with boards which have been the standard of the system—wood boards with red and green colored lead plugs. The lines, etc., are shown in the same way as on the system board and use the same color system of the indicating voltages.

In addition to this board, the system operator has available two cordless telephone boxes in parallel to permit two men to work, and has private leased Bell lines to the generating stations and important substations and to the dispatchers' offices of the Central Hudson Company at Ohioville, N. Y., and the Pennsylvania Power & Light Company at Hazleton, Pa. In addition there are lines to private branch exchange boards and to the chief system operator's office.

Pneumatic tubes connect both the system and the local dispatchers with the trouble dispatchers' office, which are used for the transmission of written orders for the operation of switches at unattended substations and line switching stations, and for line patrolling. All distribution trouble in the city is taken care of by the trouble dispatchers.

The system operator has, for his meter equipment, a curve-drawing Esterline-Angus voltmeter with quick-trip attachment, a Leeds & Northrup graphic frequency meter, a General Electric tuned type indicating frequency meter, a curve-drawing Bristol thermometer and a curve-drawing barometer.

A comprehensive list of tagging or blocking rules is in use by the Pennsylvania-New Jersey power system for protection of men working on or near any electrical circuits or apparatus. A copy of these rules is included in

Major Duties of Men Engaged in System Operation

Chief System Operator

1. Supervises the work of system operators and local dispatchers.
2. Writes or approves standing instructions.
3. Arranges interchange of surplus power with other power systems.
4. Makes out intercompany bills.
5. Operating data and statistics.

System Operators

1. Division of load on various generating stations.
2. Regulation of interchange of power between systems.
3. All switching and tagging on transmission lines (66 kv. and above).
4. Preparation of interruption reports appertaining to transmission lines, high-tension substations and generating stations.

Load Dispatchers

1. All switching and tagging on local distribution lines.
2. Preparation of interruption reports appertaining to distribution system.
3. Handling service complaints. Note: Complaints on 2,300-volt service at Reading, Lebanon and Easton (the latter from 7 a.m. to 5 p.m.) are handled directly by the line department.

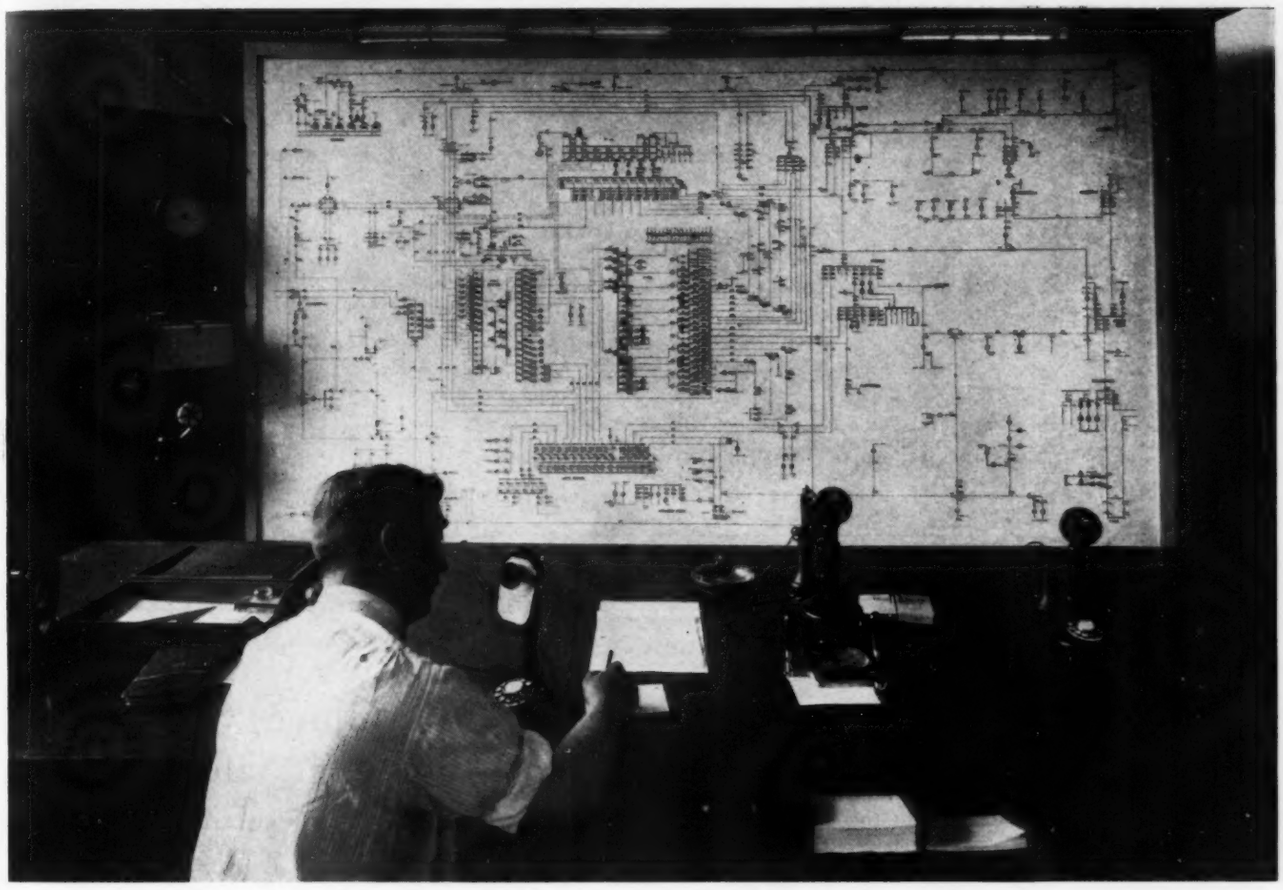
Operating Instructor

1. Conducts schools and system operators, dispatchers and operators on operating procedure, tagging and safety practice.
2. Writes standing operating instructions applying to all generating stations and substations.
3. Checks and approves all line diagrams before they are published.

Switch Designations for System Operator's Board

0—Tie oil circuit breaker in station.
1—Inside oil circuit breaker.
2—Outside oil circuit breaker.
3—Air breaker or knife switch connecting to No. 2 main bus or to sleet bus.
4—Air break or knife switch connecting to main bus.
5—Air break or knife switch on line side of station.
6—Air break or knife switch on power source side of tap.
7—Air break or knife switch in tap.
8—Air break or knife switch connecting to auxiliary bus.
9—Air break or knife switch on load side of tap.

In the numbering system used, the last digit (as above) indicates the use of the switch, the second to the last digit shows the station number and the other figures constitute line designations. The latter are arranged in blocks to indicate the voltage of the circuit.



LOCAL DISPATCHING BOARD AT READING

the line-diagram book which is furnished to every man on the tagging list to show the exact connections of all apparatus and lines.

The system operator, as well as the local dispatchers, use what are termed "order tickets" for keeping a record of all switching ordered and of all reports that he receives. These tickets are consecutively numbered and have a distinguishing letter to indicate the office issuing them, and are copied at the end of the day to form the dispatchers' log. When a dispatcher issues an order to a substation operator over the telephone, he gives him the ticket number as the operator repeats the order correctly, without which he is not authorized to do said switching. All "order tickets," regardless of whether calling for switching or merely recording reports received, are stamped in the calculagraph as soon as they are issued.

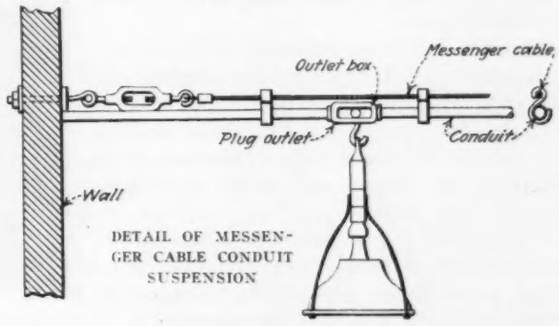
Another form used is the "line or apparatus application" blank, which is made out by the person desiring to do work on any part of the system, with spaces provided for giving all information required by the tagging rules. These blanks are then sent to the dispatching office and, if approved, the necessary switching required is added and the carbon copy is returned as his authority to proceed with the work at the time requested.

Dispatchers are required to make a "system trouble report" of all automatic oil switch operations to the relay department, giving the numbers of all switches operating, together with a number signifying the type relay which caused the switch to open. On the reverse side of this sheet is a list of all switches in the dispatcher's particular portion of the system, on which he is required to check off the switches that were open at the time the trouble occurred. This information is used by the relay department for making an actual system set-up on the short-circuit calculating table to determine the duty imposed on the breakers which operated and to analyze relay operation.

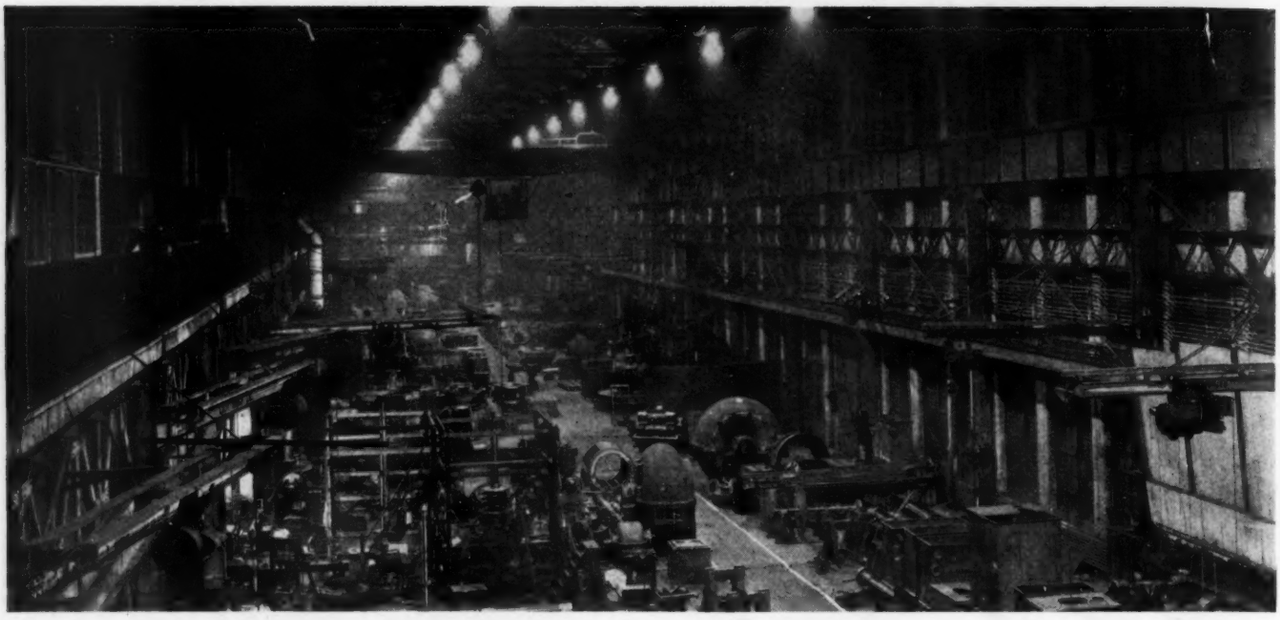
Flexible Installations Reduce Mill Lighting Costs

By Davis H. Tuck
Holophane Company, Inc.

MAINTENANCE and construction charges for lighting equipment in large mills and shops have been materially reduced by a new practice in indoor illumination. Although the endeavor has been to reduce costs, in many instances better mechanical, electrical and



DETAIL OF MESSENGER CABLE CONDUIT SUSPENSION



WELL-ILLUMINATED SHOP USING CONDUIT ON SUSPENDED MESSENGER CABLE

illumination jobs have been made and maintenance work has been greatly facilitated.

Conduit is assembled on the floor in convenient lengths, usually 50 ft., and the condulets are placed to meet lighting requirements rather than the structural limitations of the building. A special hook is attached to the conduit at frequent intervals, and when installed, the latter is hung upon a suspension wire, as indicated in the illustration. When in place the hooks are closed by a hammer blow. Assembly of the conduits on the floor instead of on top of ladders or staging is estimated to reduce the labor cost by approximately one-third. This plan has the added advantage that the messenger cables serve as effective shock absorbers so that crane movement or plant vibration does not cause premature lamp failures.

When the reflector equipment is rigidly fastened to the condulet, it is necessary, unless disconnecting hangers are provided, to use ladders for cleaning and maintenance purposes. It is frequently desirable to shift reflectors a short distance from their established position. A method of suspension has been devised that renders maintenance less difficult and permits flexibility. The reflector is suspended from a hook located on the condulet or in the ceiling, and the electrical connection is made through a plug and heavy duty flexible conductor. With this unit the entire device may be taken down to the floor for cleaning and servicing operations.

In large shops two men may perform the maintenance work quickly. One, riding on the crane, disconnects a reflector and lowers it to the floor with a rope and then raises a cleaned and relamped unit. The floor man performs the service operations necessary in each case.

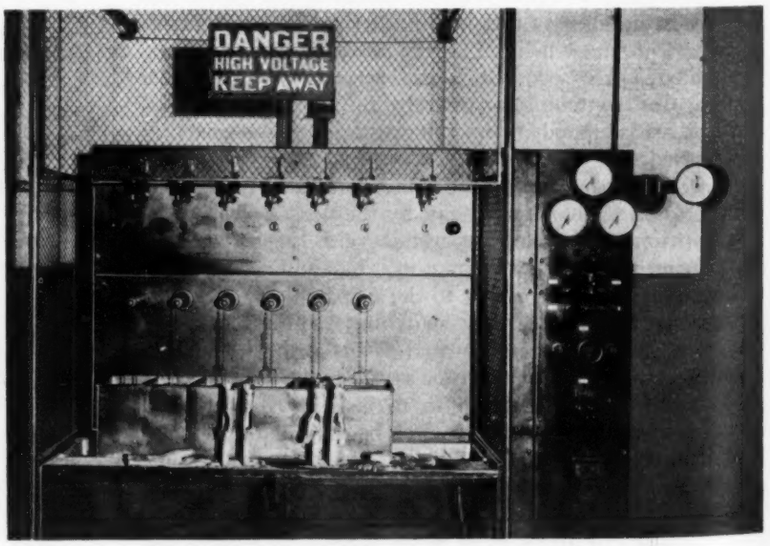
This arrangement has been satisfactory in a number of installations and may supplant to a large extent the customary methods of securing mill illumination.

Testing Gloves Speedily but with Safety

Breakdown of glove doesn't interrupt test of others. Apparatus can't be energized while unguarded. Method of testing leakage and timing tests

THE routine testing of rubber gloves requires apparatus designed for safety and production. J. L. Sykes, foreman in the high-tension tests section of the meter and tests department of the Duquesne Light Company, has perfected such apparatus. The improvements include interconnected switches, full supply of indicating lamps, accurate measurement of leakage voltage and a better timing device.

Six 110/11,000-volt, single-phase transformers are used, so that it is possible to test from one to six pairs of gloves at once. An air circuit breaker opens if any of



IMPROVED HIGH-TENSION PANEL FOR GLOVE TESTS

the gloves fail under test. The high-voltage circuits are wired so that one lead of the high-voltage windings of each transformer is connected to a common lead and grounded through a milli-ampere current transformer. The other individual leads from the transformer are brought through the face of the panel by 15,000-volt wall bushings. The ends of the bushings project over a large copper tank filled with water. The gloves to be tested are placed in copper forms, filled with water and placed in this tank, and a chain connects the inside of the gloves with the bushings. The tank contains six separate compartments and is connected to the grounded lead on the grounded side of the current transformer. Above the high-tension bushings are seven air circuit breakers; 3-amp., 600-volt breakers are used in the copper primary circuit of each transformer and a 25-amp. breaker is used as a master breaker.

One lead of the low-tension winding (or primary) of each transformer is also wired to a common lead. The six other individual leads are each connected to a separate breaker, making a breaker in the primary of each transformer. If a glove breaks down, the breaker on that particular transformer opens, and the test continues on the other gloves.

Under each breaker is placed a green pilot lamp. The green light indicates which breaker has opened. A small contact switch was constructed, which is operated by the arm of the circuit breaker. When the breaker is closed, the contacts are opened and the light is off. When the breaker is open, the contacts are closed, causing the green light to light. The lighting circuit is not connected to the testing circuit, except at the source.

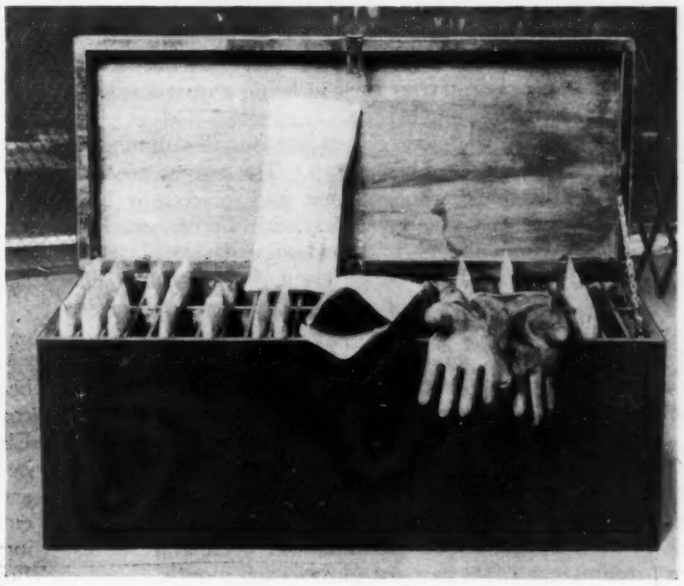
The testing panel is screened and is equipped with a gate that moves up and down in front of it. To keep the gate from binding on the guides, a single weight is used to counterbalance it. The weight is hung against the wall and travels between two guard rails. An arm on the upper end of the counterbalance operates a safety switch mounted on the wall. This switch is a specially constructed 100-amp., double-pole, double-throw knife switch placed in a safety box. When the gate is open, the supply to the transformers is short circuited. The master breaker is in series with the supply circuit, and if the gate be raised but 2 in., the safety switch opens the transformer circuit and short circuits the master breaker, which will open if current is supplied. When the safety gate is closed, the transformer circuit is placed in series with the master breaker.

A signal switch is attached to the safety switch and works with it. If the gate is open, a white pilot light on the control panel lights, which signifies that the gate is open and the control switch cannot be closed. When the gate is closed, the white light goes out and the green one lights, which signifies that the gate is closed and the central switch can be closed. When the switch is closed, the green light goes off and the red lights on the panel light.

Two 25-watt lamps are placed at each side of the testing panel and light only when gloves are being tested. The red lights are connected to the testing circuit at the control switch and light only when the switch is closed. Closing this switch also operates a 110-volt contactor relay, which opens the green signal light circuit. When the control switch is open, the contacts on the contactor relay close the green light circuit.

Behind the control panel is an auto-transformer used to regulate the voltage. The control knob of this transformer is on the face of the panel. A double-pole, double-throw switch is used to supply either 110 or 220 volts from a single-phase, 110-220 volt circuit. By using the 220-volt circuit, gloves can be tested at 14,000 volts.

COPPER FORMS FOR RETAINING GLOVES DURING TESTS



DISTRIBUTION CABINET FOR TESTED GLOVES

Measuring Leakage and Timing Tests

The set has unusual unique features, the method of measuring the leakage current and the timing device.

As mentioned before, the common lead of the high-voltage windings passes through a current transformer before being grounded. This transformer was built with two secondary windings and has a ratio of 20 milliamperes to 5 amp. and 200 milliamperes to 5 amp. A regular 5-amp. ammeter can be used with this transformer and is of much more rugged construction than a milliammeter. If a glove fails during test, the excessive current will not injure the transformer or ammeter, as

would be the case if a milliammeter were used. An ammeter switch on the panel changes the ratio of the transformer. If one glove or one pair is being tested, the 20-milliampere scale is used, and if six pairs are tested, the 200-milliampere scale is used. A leakage of 10 milliamperes on one glove or 120 milliamperes on six pairs at 10,000 volts is the maximum allowed.

To time the tests, a scale marked in seconds is placed on a switchboard meter. A Warren constant speed clock motor is used, the hand making one revolution per minute. This clock is controlled by the same testing circuit as are the red lights.

The voltmeter measures the primary voltage on the transformers, the scale being marked as secondary voltage. A voltmeter switch changes the reading on the meter to either 3,000 or 15,000 volts full scale. An ammeter in the circuit indicates the current on the entire set.

After the gloves are tested, they are placed on a drying rack. The gloves hang with their gauntlets down over a wire support, and heated air is forced up around them. By using this method of drying, the gloves do not have to be turned. A new drying rack is being constructed and is expected to save much time.

After drying, the new gloves are serially numbered. This is done with a rubber stamp. The gloves are then dusted with powdered soapstone and placed in large manilla envelopes. The envelopes, with the names of the persons to whom the gloves are assigned, are placed in boxes and delivered to the different departments. The record of the tests are kept on all old gloves. All gloves are examined over a frosted lamp before being tested to insure satisfactory conditions.

All of the equipment used conforms to the standards of the American Society for Testing Materials.

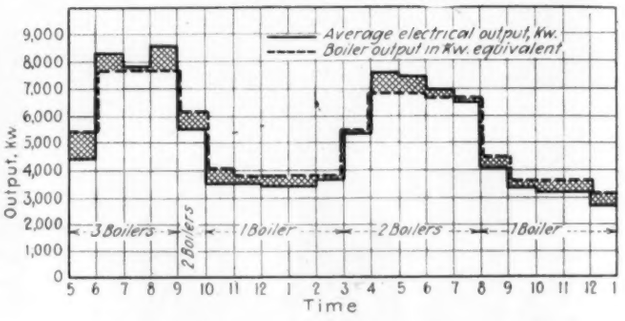
There is one improvement that could be made, and that is the substitution of a voltage-regulating device for the auto-transformer. This would give a constant increase in voltage instead of steps.

With this equipment one man has been able to test approximately 1,200 pairs of gloves each month.

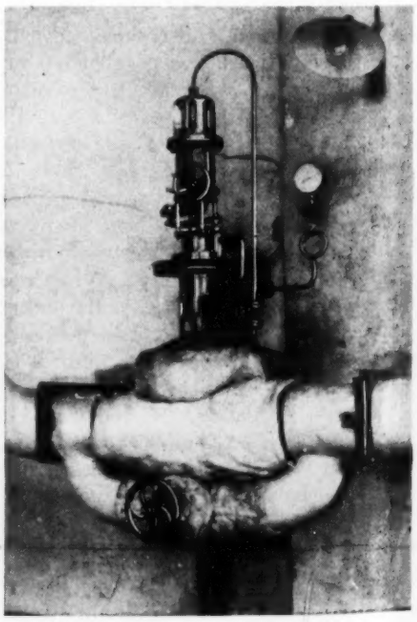
Steam Accumulator Carries Momentary Peaks

Rapid fluctuations in demand compensated for by steam reserve capacity in form of an accumulator in the station of the Hamburg Elevated Railway, Ltd.

LOAD fluctuations at the power station of the Hamburg Elevated Railway, Ltd., as in other railway stations, are sudden and of brief duration, being measurable in seconds, whereas in light and power systems such changes usually take many minutes and follow a fairly regular cycle hour by hour. Therefore, an automatic arrangement which will function in a fraction of a second has been provided to store or release steam as needed, according to Dr. W. Mattersdorff, director Hamburg Elevated Railway, Ltd. This was accomplished by the installation, outside of the engine room, of a Ruths steam accumulator, consisting of two drums of about 4,500 cu.ft. capacity each. The surplus steam generated during period of small load is accumulated through the functioning of an oil-operated valve and is released for



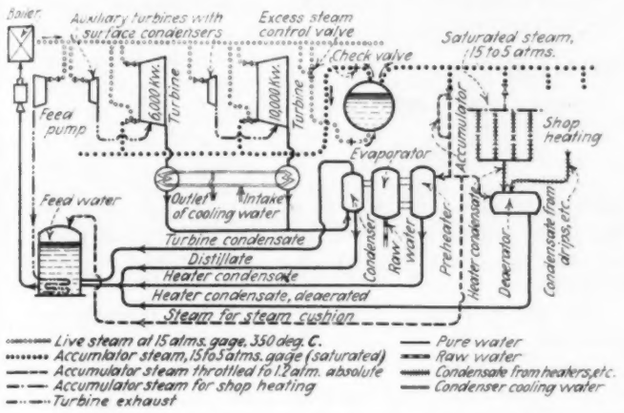
HOW THE ACCUMULATOR SMOOTHS OUT THE PEAK DEMANDS ON STEAM



ACCUMULATOR TANKS, UNDER END OF CRANE, STORE AND RELEASE STEAM AS NEEDED. AT RIGHT, OIL-OPERATED VALVE CONTROLLING ACCUMULATOR

power production at times of heavy load. By allowing a pressure drop from 15 to 5 atmospheres, 22 tons of steam can be delivered from storage. The largest turbine available at this station (6,000 kw.) was rebuilt for operation with either superheated live steam or saturated steam from the receiver.

An outline of the system for utilizing the steam accumulator is shown. The oil-operated valve for admitting



SCHEMATIC DIAGRAM OF STEAM AND WATER SYSTEM FOR UTILIZING STORED STEAM

the surplus steam closes the connection to the boilers when the pressure in the latter falls below 13.2 atmospheres and reopens as soon as the pressure rises. By means of a governor valve at the turbine, the stored steam is drawn upon when the boiler pressure falls below 13.1 atmospheres and is shut off when the boiler pressure exceeds 13.1 atmospheres or the pressure in the receiver falls below 5 atmospheres.

In addition to providing for load peaks, the steam accumulator serves to equalize the output and provides temporary reserve in case of boiler trouble. Formerly it was necessary to provide for the morning and evening peaks by large additions to the heating surface used in continuous operation, with correspondingly high losses when putting the boilers in and out of service. Under the new arrangement the peaks are absorbed, so that it is necessary to increase by only 60 per cent the heating surface in continuous service.

Without accumulators, the load fluctuations were so sudden and so great that the safety valves blew off on falling loads and increasing loads frequently produced a drop in boiler pressure. With accumulators, firing is adapted to changes in the electrical load, gradually and without large losses, and surplus steam is taken up in the receiver. Increased demand decreases boiler pressure and the surplus steam is drawn from the accumulators.

In case of temporary trouble in the boiler installation, it is possible to run the turbine for a time on stored steam and thus insure continuity of service, either until repairs are made or until the banked reserve boiler has been fired up to take care of operations.

Aside from instantaneous peaks, the electrical load on a typical day rises by 73.5 and

COMPARISON OF ELECTRICAL AND STEAM LOADS FOR A TYPICAL DAY

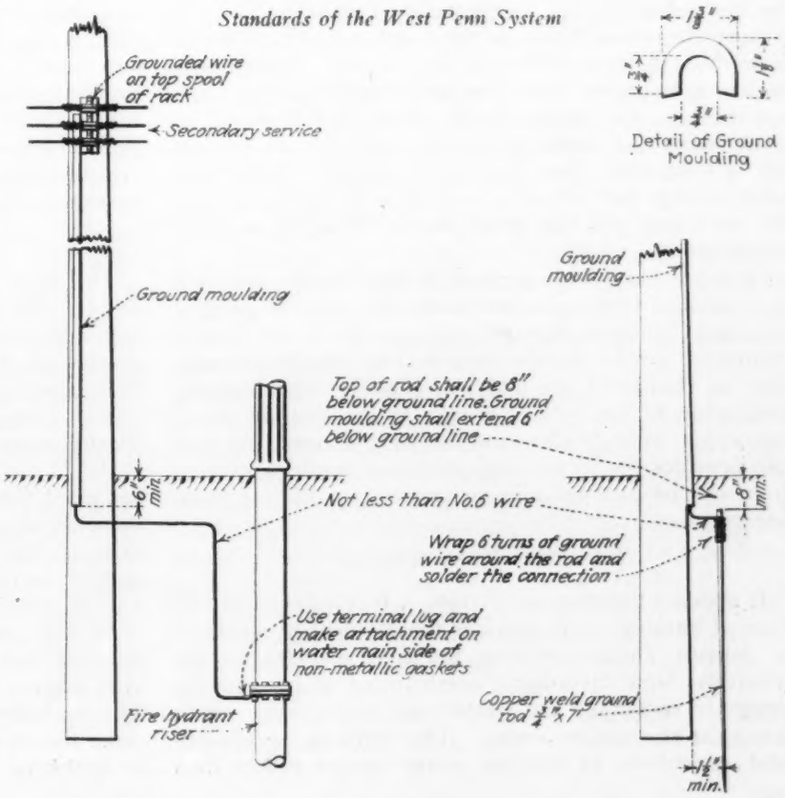
Electrical Output	Kw.	Per Cent
Average load	4,350	100
Maximum 15-minute peak		
Forenoon	7,580	173.5
Afternoon	6,950	159
Maximum instantaneous peak		
Forenoon	9,300	213
Afternoon	8,700	200
Boiler Output	**Tons (Metric) per Hour**	**Per Cent**
Average output	28.5	100
Maximum 30-minute peak		
Forenoon	44	156
Afternoon	35	123

59 per cent above the average in the forenoon and afternoon respectively, but it is necessary to increase the output of the boilers by only 56 and 23 per cent above the average, because of the use of heat storage. During the forenoon of such a day about 1,800 kw.-hr. is generated from accumulated steam during four hours, and in addition about 9 tons of steam is taken from storage for heating; in the afternoon 2,600 kw.-hr. and 1 ton of steam for heating are removed.

The highest instantaneous load that has been carried by stored steam approximated 2,400 kw. The highest 15-minute load was about 1,800 kw. During the afternoon peak about 8 per cent of the total output was generated from stored steam. In this case, because of the comparatively small quantity of stored steam used to supplement live steam, the former becomes superheated by the turbine blades to such an extent that it operates with approximately the same thermodynamic efficiency as the live steam.

Ground Connections for Secondary Circuits

Standards of the West Penn System


Grounded wire on top spool of rack
Secondary service
Detail of Ground Moulding
Ground moulding
Ground moulding
Top of rod shall be 8" below ground line. Ground moulding shall extend 6" below ground line
6" min.
Not less than No.6 wire
6" min.
Wrap 6 turns of ground wire around the rod and solder the connection
Use terminal lug and make attachment on water main side of non-metallic gaskets
Fire hydrant riser
Copper weld ground rod ¾" x 7'
½" min.

A Southern Rural Rate

In form of graduated service charge based on customer density with low energy charge. Classifying rural customers into four density groups and provision for seasonal features

By E. W. ASHMEAD

Assistant Commercial Manager Alabama Power Company, Birmingham, Ala.

THE Southeastern Power & Light Company, following a three-year experimental program of rural electrification in Alabama, has recently announced a very material expansion of this activity throughout all of its properties in Alabama, Georgia, Mississippi, Florida and South Carolina. There are in excess of one million farms in these five states, which constitute a tremendous new field for the sale of electric energy.

During the experimental period of this work in Alabama, which Dr. E. A. White, director of the National Committee on the Relation of Electricity to Agriculture, has described as the greatest experiment of its kind in the country, more than 3,500 rural customers have been connected to the system of the Alabama Power Company, consuming in 1926 a total of 2,700,000 kw.-hr. Along with the connection of this rural business, which in the initial steps of progress has of necessity been adjacent to the large cities and towns, and the study of farming problems and possible requirements for electric energy, much thought has been devoted to developing a proper rate for such service which would allow the extension of lines into more remote sections and give the farmer the benefits of electric service at a price both economical for his needs and fair to the utility furnishing it.

Agricultural conditions in the South are very different from those in other sections of the country. Except near our cities, Southern farms are more widely scattered and less uniform in size than in the North and West. The cotton farm also lends itself only slightly to an efficient use of electricity. Few uses are found for large power loads outside the industrial and mining centers, except for the cotton gin; the latter demand is highly seasonal in character.

Owing to the great variation in farm density and lack of diversified farming in the South, the principle adopted by many utility companies of a uniform or slightly graduated service charge does not fit Southern conditions as readily as one that will allow a wider scale of graduation in the service charge as between the small farmer, or rural dweller, and the large farmer, and that also provides for service with customer-densities varying from one or two per mile to twenty per mile of rural line.

TWO-PART RATE ADOPTED

It appears that a two-part rate is best adapted to this class of business, as it provides the payment of a service or delivery charge covering the fixed charges on the relatively high investment needed and a low energy charge to encourage the greater use of electricity which it is most essential to secure. The company has considered agriculture as needing power service rather than lighting service, and at the same time has recognized that many small farms and rural dwellers can at present use little energy other than for lighting and household appliances.

The rate schedule given herewith has recently been approved by the Alabama Public Service Commission for use on the lines of the Alabama Power Company, one of the Southeastern Power & Light Company subsidiaries. This rate is effective on new lines authorized and constructed subsequent to July 1, 1927, and on existing lines at the option of the customer. It will become effective for all rural service after June 30, 1930.

Briefly, this rate, which allows lighting, cooking, heating, refrigeration and farm power service under one meter, is quite similar to the usual urban demand form of rate, differing mainly in that the first kilowatt of load carries a variable rate depending on the customer-density of the rural line, that allowance has been made for a rather wide diversity of farm power use and that not less than 10 kw. of contracted capacity per mile of line shall be signed for.

In this rate a rural line is defined as any electrical distribution line of 11,000 volts or less, not within the corporate limits of a municipality, which serves less than twenty customers per mile of pole line, and under certain conditions within municipal limits also. Each rural line is considered as a unit in determining its group rating, unless there is such a wide difference in customer-density between sections and branches of the line that it is desirable to split it into two or more units to prevent unreasonable discrimination.

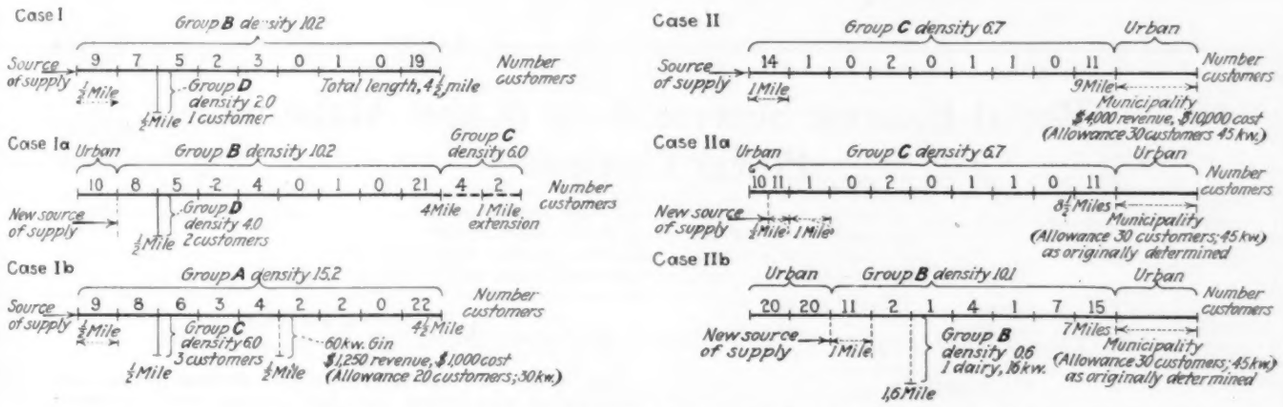
BASIS FOR SERVICE CHARGE

The basic service charge, known as the "rural line charge," for the first kilowatt of contracted capacity of each customer is dependent upon the average customer-density of the particular line in question, there being four density groups with initial kilowatt charge as follows: Group A, $1.75 per month when the average density is more than fifteen customers per mile; Group B, $2.25 for more than ten and not more than fifteen per mile; Group C, $3 for more than five and not more than ten per mile, and Group D, $4 for five or less per mile of line. Each additional kilowatt of contracted capacity is furnished at a uniform rate of $1.50 regardless of density rating.

In determining the customer-density, credit is given the rural line for urban or industrial business fed from such line on the basis of "equivalent rural customers." The equivalent rural customers are found by taking four times the estimated first year's revenue from such urban or industrial load minus the initial cost to connect it to

the rural system and dividing the remainder by four times the average revenue per rural customer, which is assumed to be $50 per year. A credit of 1½ kw. is also allowed for each equivalent customer. The "initial cost" of serving industrial or urban business is determined as that part of the original cost of the new work required which is in excess of the cost of a single-phase line to serve the present or future rural customers connected to it. It would include substation changes, adding a third phase to the rural line, distribution lines within a municipality, transformers and metering equipment for industrial or urban loads.

Under minimum load conditions the total rural line charges per mile of line will vary between the following limits for each group density: Group A, $35 to $26.25 per month, depending on the actual number of customers connected; Group B, $33.75 to $22.50 per month; Group C, $30 to $22.50 per mile, and Group D, $27.50 to $17.50 per mile. These line charges will produce a revenue averaging between 12 and 15 per cent of the estimated



APPLICATION OF ALABAMA POWER COMPANY'S RURAL RATE TO TYPICAL RURAL LINES

investment cost of the rural line. The energy charge is a block rate, the first 50 kw.-hr. being at a net rate of 5 cents, the next 950 kw.-hr. at 3 cents net, and all over 1,000 kw.-hr. at 2 cents net.

The contracted capacity of each customer, except when an additional guarantee is needed to meet the minimum capacity requirement of 10 kw. per mile, is determined as the sum total of his computed load requirements. Lighting load, including lamp socket appliances, is not counted unless there is no other load connected. Motor load in kilowatts is taken as 70 per cent of the horsepower rating of the largest motor and 50 per cent of the horsepower rating of all other motors. Cooking load is taken as 25 per cent of the manufacturer's rating, but not less than 2 kw. Heating and all other load is taken as 100 per cent of rating, or by test, at the company's option. Double-throw switches are permitted to reduce the contracted load to the maximum that can be operated simultaneously.

An interesting and unique feature of the rate is the provision for seasonal farm power. Any motor of 10-hp. rating or larger used solely for farm power service is considered a seasonal load and the kilowatt capacity determined as 25 per cent of its rating in horsepower, provided the excess transformer capacity required for its operation is furnished by the customer. Three-phase service, where available, may be established for motor loads of 5 hp. and over and billed as a separate customer under this rate.

Reference has already been made to the minimum capacity guarantee of 10 kw. per mile. Should the total loads of all customers served under this rate plus the credit allowed of 1½ kw. per equivalent rural customer for revenue received from urban or industrial business served from the rural line be less than an average of 10 kw. per mile for the particular line in question, the additional capacity necessary to meet this minimum load would have to be contracted for and apportioned equally among customers or in such manner as the customers might desire.

New customers added to a rural line will be served under the same service charge as existing customers on that line, unless such addition constitutes an extension that would reduce the average number of customers per mile of line, in which event it shall be considered a new rural line. Provision is made in the schedule for the adjustment of service charges on Jan. 1 of each year, but it is probable that, following the absorption of guaranteed capacities by the addition of new customers and new load, the group rating of any line will not have to be changed more than once in five or ten years.

Whenever the density of a rural line or section of such line adjacent to the source of supply reaches twenty customers per mile, it shall become an urban line and be served at the urban rates applicable, provided the remainder of the line can be served without increase in rural service charges.

Examples of Application of Rate

A few typical examples of the application of this schedule to assumed conditions may be helpful in understanding it.

Case I, on the accompanying illustration, diagrammatically illustrates a rural line that is quite typical of conditions in Alabama. The average density of this 4½-mile line, excluding the ½-mile branch line, is 10.2 customers per mile. The density for the first mile from the source of supply is sixteen as compared with ten for the last 2 miles, but the average density of the main line would classify all these customers as a unit under Group B, while the branch line should manifestly be considered as a separate rural line and rated as Group D. (As an alternative the main line could be considered as two separate lines, the first mile rated as Group A, and the remaining 3½ miles as Group C, but it is preferable to consider the whole line as a unit.)

The Group B customers would each pay a monthly line charge of $2.25 unless any customer's own load re-

quirements exceeded 1 kw., in which case he would pay an additional $1.50 per kw. for such excess. The Group D customer would be required to contract for at least 5 kw. (10 kw. guarantee multiplied by ½ mile of line) and would pay $3 for the first kilowatt and $6 for the additional 4 kw., or a total of not less than $9. The energy charge to each of these customers would be 5 cents net for the first 50 kw.-hr., 3 cents net for the next 950 kw.-hr. and 2 cents net for all over 1,000 kw.-hr.

Case I*a* shows a subsequent change that might occur due to addition of new customers who would be served at the same line charge as existing customers until the revision date. On Jan. 1 following this change the line would be rerated as shown. The first ten customers would be transferred to urban rates provided the remainder of the original line had increased its density to a figure in excess of ten customers per mile. The eight customers on the second half-mile are not to be rerated as Group A until the entire main line reaches a Group A density and another adjustment of rating is made.

The additional customer added to the branch line does not change its group rating, but the original customer would have his contracted capacity reduced from 5 kw. to 2½ kw. unless his actual load requirements were in excess of that amount. Each of these two customers would pay $6.25 per month rural line charge, or they can elect to split the excess guarantee between them as they may desire. However, should one of them require 4 kw. and the other only 1 kw., their respective charges would become $8.50 and $4. The extension of 1 mile of line to serve six new customers is considered as a new line, since the density is lower than the original line. As in the former case they are rated as a unit, in this case under Group C, and would each pay a base rate of $3 per month for the first kilowatt. The additional 4 kw. which they would have to guarantee under the minimum provision would be apportioned equally between them, or $1 each, unless one or more of them had load requirements that would help absorb this amount. Assuming that two of them had electric ranges, there would be only 2 kw. additional guarantee to be

Rural Electric Service Rate of the Alabama Power Company

Effective for service rendered from rural lines authorized and constructed subsequent to July 1, 1927; for service rendered to any rural consumer requesting this classification on existing experimental rural lines; and for all rural service after June 30, 1930.

Service Classification "E" Rural Electric Service 110-220 Volts

Availability

Available to any consumer served from a rural distribution line of the company for electric lighting, cooking, heating, refrigeration or farm power service, or any combination of these, where the total consumption can be measured by one meter.

Rate

5½ cents per kw.-hr. for the first 50 kw.-hr. consumed per month; plus

3½ cents per kw.-hr. for the next 950 kw.-hr. consumed per month; plus

2½ cents per kw.-hr. for all over 1,000 kw.-hr. consumed per month.

Discount

The current monthly bill is subject to a discount of ½ cent per kw.-hr. of energy consumed, provided the amount is paid in full at the office of the company within ten days from date of bill.

Rural Line Charge

In addition to the rate for electric energy actually consumed each consumer receiving service from a rural line shall pay monthly a rural line charge based upon the number of consumers per mile and the individual capacity contracted for, as follows:

	Consumers per Mile			
Monthly Rural Line Charge:	Over 15 Group "A"	Over 10 and Not More Than 15, Group "B"	Over 5 and Not More Than 10, Group "C"	5 or Less, Group "D"
For the 1 kilowatt of contracted capacity or fraction thereof	$1.75	$2.25	$3.00	$4.00
For each additional kilowatt of contracted capacity	1.50	1.50	1.50	1.50

Determination of Consumers Per Mile and Consumers' Contracted Capacity

The consumers per mile shall be the total number of consumers served from the rural line, not including those in urban centers served from such line, divided by the total mileage of distribution pole line serving such consumers, exclusive of service lines.

The contracted capacity of each consumer shall be the sum total of his load requirements determined as hereinafter set out but not less than an amount sufficient to bring the total contracted capacity of all consumers served by a rural line under this classification to a minimum of 10 kw. per mile of rural line. When urban or industrial load is served from a rural line, the company will credit the rural line with such business and will modify the minimum rural requirements according to Rule 9 under Special Rules Governing the Application of Service Classification "E."

Lighting Load.—Ordinary farm and household lighting load (including lamp socket appliances not permanently connected) will not be counted in determining contracted capacity, except where no other load is connected and in such case of lighting load only the contracted capacity shall not be less than 1 kw.

Motor Load.—

(a) General Power:

The kilowatts of motor load other than seasonal power shall be as follows: 70 per cent of the horsepower rating of the largest capacity motor; plus 50 per cent of the horsepower rating of all other motors.

(b) Seasonal Power:

The largest capacity motor used exclusively for farm power service, if of 10-hp. rating or over, shall be considered a seasonal load and the kilowatts of motor load shall be taken as 25 per cent of its horsepower rating, provided the transformer capacity required for its operation is furnished by the consumer.

Range Load.—25 per cent of the connected domestic range load, but not less than 2 kw.

Heating and All Other Loads.—100 per cent of the manufacturer's rating of such equipment, or by test. Where double-throw switches are used, the maximum sum total of the consumer's loads, as determined above, which can be operated at one time, will determine the contracted capacity.

absorbed by all six customers. In other words, the two customers with ranges would pay for 2⅓ kw., or $5 each, for line charge, and the four other customers for 1¼ kw., or $3.50 each. It should be noted here that any additional capacity necessary to meet the minimum load requirement should be apportioned equally among all customers or in such other proportion as the customers themselves may desire.

Case I*b* shows a change of a different character occurring on the original line. A new half-mile branch and third phase back to the source of supply has been built to serve a cotton gin having an estimated annual revenue of $1,250 and costing $1,000 of additional investment to serve ($1,700 total cost minus $700 cost of ½ mile single-phase line). The credit allowance for this business would be as follows: $(4 \times 1{,}250 - 1{,}000) \div 200$ equals twenty equivalent customers and 30 kw. of load.

Since the original main line is considered as a unit in applying rural line charges and since the new power load is fed from this main line, the credit would be applied equally to all the original Group B customers, including those that have been added, thus giving them a new density rating of $(56 + 20) \div 5$ equals 15.2 per mile, or Group A. (The ½-mile line to serve the gin is included in the new rural line mileage, since its cost was deducted in determining the equivalent customer credit.) Original Group D branch, being a separate and distinct rural project, is entitled to no credit for the gin business. However, since two additional customers have been added to this branch, its rating is now Group C.

The Group A customers will secure a reduced basic line charge to $1.75 for the first kilowatt of each customer's contracted load, whereas each Group C customer will pay $3 plus his proportion of the $3 additional charge to cover the 2 kw. of additional guarantee required on the branch line.

Should the gin, instead of having been located as shown, be on the original Group D branch, assuming the same revenue and additional cost figures, both main line and branch line would be consolidated into a single project having a Group A density of 15.8.

Case II shows another typical example illustrating a

Rural Electric Service Rate of the Alabama Power Company—(Continued)

Optional Deposit in Lieu of Rural Line Charge

Any consumer receiving service from a rural line may, at his option and in lieu of the monthly rural line charge, deposit with the company an amount equal to $150 for each $1 of monthly rural line charge as determined above. Such deposit will be returned to the consumer in full without interest at the time of the termination of his contract and in no instance less than one year from the beginning of service.

Special Rules Governing the Application of Service Classification "E"

1. A rural line is defined to be:

(a) Any electrical distribution line of 11,000 volts or less, not within the corporate limits of a municipality, which serves less than twenty consumers per mile of pole line, and/or

(b) Any electrical distribution line of 11,000 volts or less, within the corporate limits of a municipality, which serves less than twenty consumers per mile of pole line, upon approval of the Alabama Public Service Commission.

2. Each rural line as originally constructed shall be considered a unit in applying the rural line charge, unless there is such a wide difference in consumer-density between sections or branches of such line as to constitute marked discrimination against the higher density group, and in this event such sections or branches may be considered separate rural lines.

3. New consumers added to a rural line will be served under the same rural line charge as existing consumers on such line, unless such addition constitutes an extension which would reduce the average number of consumers per mile of line, in which event the extension shall be considered a new rural line.

4. Any section of a rural line immediately adjacent to the source of supply of such line reaching a density of twenty consumers per mile shall become an urban line and service shall be rendered to such section at such urban rates as may be applicable, provided the remainder of such rural line can be served without increase in rural line charge to the consumers served therefrom.

5. The rural line charge or equivalent optional rural line deposit of each consumer shall be subject to adjustment on Jan. 1 of each year.

6. The company will furnish and install, free of expense to the consumer, service wires from its pole line to the first approved point of permanent support, or to the first pole of service on consumer's premises. Special service lines required to be constructed on private property shall be constructed by the company at cost and will be subject to a special agreement between the company and the consumer, or consumers, to be served.

7. Where three-phase service is available for farm power service, such service, at the option of the consumer, may be established for motor loads of 5 hp. and over and billed as to a separate consumer under this rate.

8. Any industrial consumer served from a rural line shall be billed at the rate on file with the Public Service Commission applicable to such service.

9. The credit to a rural line for urban or industrial business shall be figured as follows:

(*a*) *Equivalent Rural Consumers.*—To be found by taking four times the estimated first year's revenue to be received from the urban or industrial load less the initial cost to connect such additional load and dividing the remainder by 200.

(*b*) *Contracted Capacity.*—Each equivalent rural consumer as determined above shall be considered as having one and one-half (1.5) kilowatts of contracted capacity.

Note: Rule 9 is based on the company being willing to spend four times the initial annual revenue to obtain urban or industrial business served from a rural line and upon an average revenue per rural consumer of $50 per year. Reduced to a formula Rule 9*a* becomes:

Equivalent Rural Consumers equals

$$\frac{\text{Estimated First Year's Revenue}}{\$50} \text{ less } \frac{\text{Estimated Initial Cost to Connect}}{4 \text{ times } \$50}, \text{ or}$$

(4 times Estimated First Year's Revenue) minus (Initial Cost to Connect) divided by 200.

Minimum

In consideration of the readiness of the company to furnish such service, a monthly minimum charge equal to the rural line charge will be made.

Term of Contract

Service under this classification shall be for a period of not less than: (1) Five years on rural lines having an average of not more than five consumers per mile of line, (2) three years on rural lines having an average of not less than five and not more than ten consumers per mile of line, (3) one year on rural lines having an average of more than ten consumers per mile of line, and thereafter from year to year, unless terminated by 30 days' written notice.

Service

Service under this classification is subject to rules and regulations approved or prescribed by the Alabama Public Service Commission.

9-mile extension with a small municipality at the terminus. The initial cost of serving the urban business is estimated at $10,000 ($8,200 urban distribution lines plus $1,800 for third phase), with an estimated annual revenue of $4,000.

As before, the entire 9 miles, which does not include the mileage within the municipality, as that is not rural mileage, is considered as a unit in determining the customers' line charges. The credit allowed for the urban business is (4 × 4,000 — 10,000) ÷ 200 equals 30 equivalent customers and 45 kw. of load. The customer-density is therefore (30 + 30) ÷ 9 equals 6.7, or Group C. Each rural customer would have a charge of $3 per month for the first kilowatt of his contracted load and $1.50 for each kilowatt of additional load required. The minimum guarantee for the 9-mile line would be 90 kw. less 45 kw. allowed for the urban business, or a net figure of 45 kw. Should each customer have only 1 kw. of connected load, there would be required an additional guarantee of 15 kw. (45 guarantee minus 30 connected) to be apportioned equally among them. Each customer would therefore have to contract for 1½ kw. and would pay $3.75 per month line charge. If we assume that five of them took ranges, this would reduce the additional guarantee to 10 kw. to be equally apportioned, or 10 ÷ 30, or 0.3 kw. each. The range customers would then pay for 2.3 kw., or $5, each and the lighting customers for 1.3 kw., or $3.50 each. They might all elect, however, to pay $3.75 each, or any other apportionment of the line charge they desire.

Case II*a* shows a subsequent change by the addition of new customers, who would be served at the same charge as existing customers—that is, $3.75 for 1½ kw. (or $3.50 for 1.3 kw., as the case might be). On Jan. 1 following this change the line would be rerated as shown. The credit for the municipal load remains as originally determined at 30 equivalent customers and 45 kw. Since the gain in new customers has been principally adjacent to the source of supply, there will be transferred to urban rates as many of these customers (of more than 20 per mile density) as can be transferred without affecting the line charge of the remaining rural customers. (See rule of rate.) In the example shown the first ten customers would be transferred to the urban rates applicable, leaving a remainder of 27 rural plus 30 equivalent customers, or a density of 6.7 on the remaining 8½ miles of rural line. The minimum guarantee being now 85 kw. (8½ miles × 10 kw.) less 45 kw. credit for urban business, each remaining rural customer would still have to pay for 40 ÷ 27, or 1½ kw., the same as before.

Case II*b* shows a further change on this line. We now find 40 customers transferred to urban rates and the density of the remainder of the rural line increased to 10.1 per mile, reducing each customer's line charge to $2.25, with only 1 kw. required to be contracted by each. Of course, should any customer have connected more than 1 kw., he would pay $1.50 per kilowatt for such additional load.

There has also been constructed a branch line of 1.6 miles serving a dairy. This would require a minimum guarantee of 16 kw., or a monthly line charge of $26.50. Such a line manifestly would not be built unless the dairy could utilize electricity in most of its operations, such as pumping, milking, refrigeration, feed grinding, separation, etc., but with a monthly consumption in excess of 1,000 kw.-hr., which we have already obtained in a number of such installations, the average rate earned would be about 6 cents per kilowatt-hour, or lower, which meets competition from isolated plants and is comparable with urban power rates.

The examples shown have purposely been taken to illustrate rather complicated situations in order to explain the rate as fully as possible. It is believed that most lines constructed in actual practice will present simpler conditions and that the changes shown will occur much more gradually than in our assumptions. We have used ½-mile and 1-mile units in these examples only to give a more detailed picture, whereas in actual practice the rural line would be broken up in accordance with the classification, by groups, of its component parts.

This form of rate offers excellent possibilities for increasing the individual consumption of electricity, which is the key to the whole question of economical service to agriculture and at the same time offers service to the small user at a minimum of cost commensurate with the investment required.

Rural schedules very similar to this are also in effect in territory served by the Mississippi Power Company and the Gulf Power Company, subsidiaries of the Southeastern Power & Light Company. The Gulf Power Company, which operates in northwest Florida, is already serving very satisfactorily more than 200 rural customers on its rural rate schedule.

Woodpecker Thrift Display Sells Preferred Stock

A WINDOW display in which the thrift of woodpeckers was illustrated to convey the value of human beings investing in utility stocks recently attracted unusual attention throughout the territory of the California Oregon Power Company where it was shown. The chief item of interest, as shown by the accompanying illustration, was a nature study in the form of a woodpecker's winter storehouse crammed full of acorns. The storehouse consisted of a section of one of the company's power poles, which are often chosen by these thrifty birds as a proper place in which to store their savings.

THRIFTY WOODPECKERS' STORING OF ACORNS SUGGESTS INVESTING SAVINGS IN UTILITY PREFERRED STOCK

Not only did the display attract unusual notice but practically every one who paused stopped to inspect each and every detail, even to reading the several placards and samples of literature that emphasized points regarding Copco preferred stock. News items in the local papers were frequent, and even the International News Service saw fit to photograph the woodpeckers and their storehouse for a feature story to appear throughout the country. In addition a representative of a large financial institution was so impressed with the idea that he enlisted the aid of the Copco advertising department, which conceived the idea, and secured a similar pole and had it cut up into four exhibits for use by his firm throughout the East.

Range-Campaign Advertising

THE electric range campaign of the Northern States Power Company in Minneapolis, St. Paul and other cities served by the company during the months of April and May, 1927, was featured by an advertising program that contained many elements of novelty and appeal that might profitably be used by other companies in the selling of ranges. There was nothing unorthodox in the advertising mediums employed. These included newspapers, folders and broadsides descriptive of the various ranges for direct-by-mail distribution, letters to prospects, straight news items and women's page material, window displays, cutouts and other novelty pieces appealing to children, cooking demonstrations and domestic science schools, signs in offices and on company cars and buttons worn by employees to identify them with the campaign. All of these avenues of approach to the public consciousness are well known and frequently used. The factor that makes the advertising of the Northern States Power Company's campaign different from the rest is the very striking originality of its copy—copy designed to awaken curiosity and interest in the average mind.

For a week preceding the opening of the campaign a series of blind advertisements were run in the three Minneapolis and St. Paul newspapers and in the 125 other daily papers published in the territory served by the company. The character of these blind ads may be seen by the illustration herewith. The first insertion utilized the first two ads of the series, the second Nos. 2 and 3, the third Nos. 3 and 4, the fourth Nos. 4 and 5, the fifth Nos. 5 and 6, and the sixth Nos. 4, 5 and 6. These ads were invitations to the general public to write for the books the titles of which were set forth in the ads. These titles were intriguing and were directed pertinently and specifically to woman readers. Each ad was run two columns wide. The ads in each insertion were, of course, separated from each other in the paper.

Heralding the opening of the campaign was a five-column ad of page depth in which were reproduced the covers of the six booklets which were the subject of the blind ad, together with an illustration and descriptive copy setting forth the terms of sale during the campaign. While the campaign was running a series of five three-column ads were projected for weekly insertion, but only two of these were used, because it was soon apparent that the sales would greatly exceed the set quotas and it was felt that further advertising was not necessary in the campaign.

The six books which were the subjects of the blind ads were 7½ in. long by 5¼ in. wide, printed on a very light tan-colored stock and were good examples of typography. The text was written on the general theme of the effect of household drudgery on the housewife. It was emphasized that whereas the average man finds in his work interest and variety to keep him young and alive, both mentally and physically, the wife at home finds that the years of household drudgery have stultified her mind and have wrecked her charm. The argument is made in the closing paragraphs of each book that the generous use of electrical labor-saving appliances in the household will release the housewife from the drudgery

BLIND ADS INCLUDED IN A SERIES PRECEDING RANGE CAMPAIGN

Blind Husbands
If you would like to read BLIND HUSBANDS-write
Post Office Box 2074 MINNEAPOLIS, MINN.
Why rich men MARRY a second time!
If you would like to read WHY RICH MEN MARRY A SECOND TIME-write
What 10 years did to Two Sisters
If you would like to read WHAT 10 years did to 2 Sisters-write
Post Office Box 2074 MINNEAPOLIS, MINN.
The Sacrifice Husbands never Appreciate
If you would like to read The SACRIFICE HUSBANDS NEVER APPRECIATE-write
Post Office Box 2074 MINNEAPOLIS, MINN.

that takes heavy toll in only a few years. Aside from requests made personally, 3,000 women wrote for copies of these books.

After the campaign had been under way and a list of prospects had been secured, personal letters signed by the general sales manager of the company were sent out to these prospects, together with the direct-by-mail pieces furnished by the manufacturers of the ranges.

In addition to the advertising directed to the public, there was another kind of advertising aimed at the members of the company organization to keep them imbued with the same spirit of enthusiasm with which the campaign was started and to keep them informed of the sales progress being made by the various geographic divisions of the company. These appeals took the form of letters to all employees signed by the general manager, weekly report letters emanating from the office of the sales manager and weekly broadsides printed with large type on colored paper which were posted up in the various divisional offices.

The program was conceived and carried out by T. H. Kettle.

Two-Year Record of Farm Service

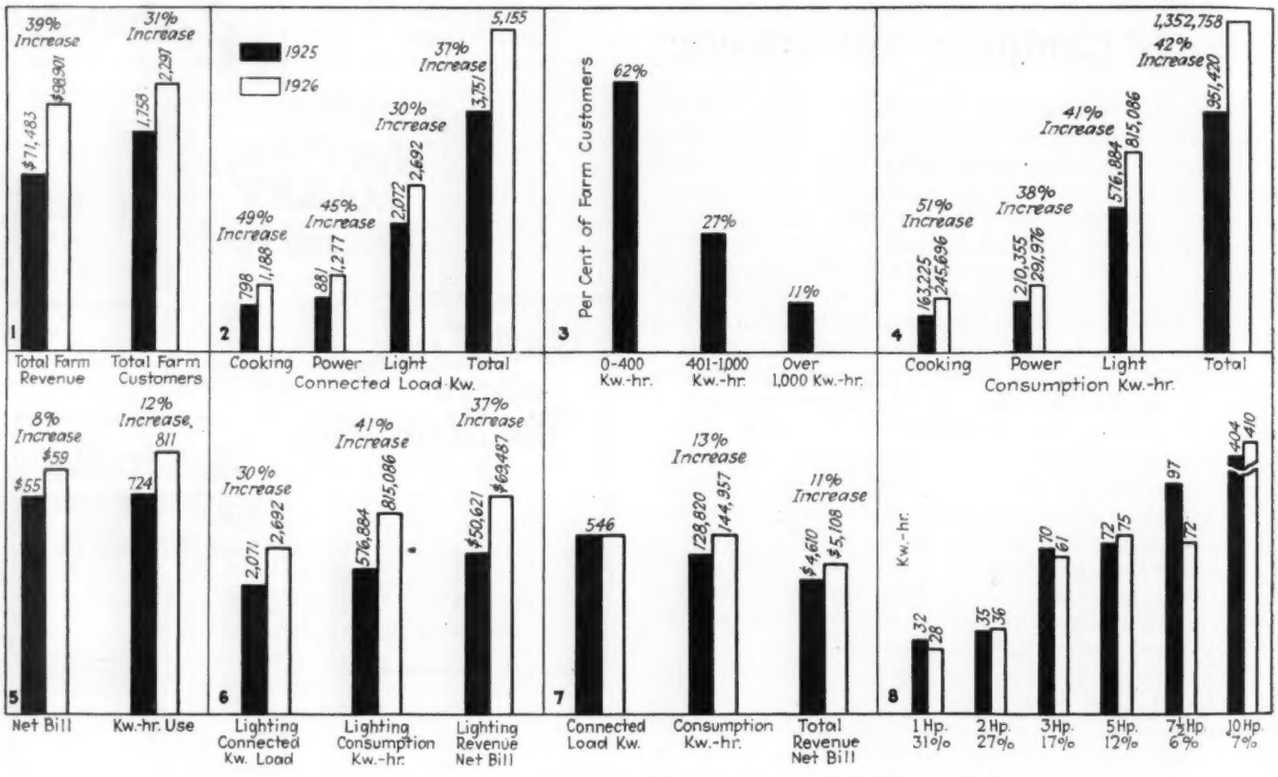
By Richard Boonstra
Agricultural Engineer Public Service Company of Northern Illinois

FARMERS located in the territory served by the Public Service Company of Northern Illinois have not been backward in taking advantage of the benefits derived from central-station service. This is due primarily to the fact that since the inception of the company's agricultural policy, service to farmers has been co-ordinated with urban and industrial service in extending transmission and distribution systems. In 1926 there were 2,297 farmers receiving electric service. This represents an increase of 31 per cent over 1925.

Growth of the rural electrification business in northern Illinois is graphically illustrated in the charts reproduced herewith. A study of these charts indicates that the greatest single gain was made in the use of energy by farmers for cooking. This is attributed to the service rendered by the company's home-service department in consistently conducting cooking schools throughout the rural territory. The survey of 69 farmers who cooked with electricity for two whole years is of special interest, as it points out the increased consumption without an increase in connected load.

In order to direct work of this nature economically, the customers were divided into three classes, as shown on the chart. This classification makes it possible for the agricultural engineer to give attention where it is needed. New farm customers are given complete wiring diagrams. This service fulfills a threefold purpose in that it tends to promote a friendly feeling between the customer, contractor and the company.

Appropriate exhibits by the company at state and representative fairs offered an excellent opportunity to demonstrate actually the numerous uses of electricity. The farm machinery dealers' co-operation added materially to the success of the demonstrations. Advertising, talks and other forms of publicity, co-ordinated with the demonstrations, have been the means of extending electric service to the northern Illinois farmer.



ANALYSIS OF ENERGY CONSUMPTION AND CONNECTED LOADS ON ILLINOIS FARMS

1. Comparison of 1925-1926 rural revenue and customers.
2. Connected rural loads.
3. 1926 energy consumption on 1,885 farms.
4. Total consumption in kilowatt-hours.
5. Average net bill and kilowatt-hour use per farmer.
6. Connected lighting load and revenue for all farm consumers.
7. Two-year survey of 69 range users.
8. Kilowatt-hour consumption per month of different size motors, showing proportion to total of various sizes. Data taken from survey of 220 farms.

Electric Trucks Prove Satisfactory in Many Fields

THE success that many owners of electric trucks are having with this class of transportation is reflected in a booklet recently issued by the New York Edison Company: "Well-Known Users Say——." Testimonial letters reproduced on the customer's letterhead, each as a separate page, with a character tone sketch and truck photograph, show that users are pleased with electric truck service.

Thirty-seven firms, representing almost as many types of business and with varied delivery problems ranging from coal to jewelry and food products, offer evidence of the wide adaptability of the electric vehicle to conditions of metropolitan traffic, with economy and low maintenance charges.

What Does It Cost?

Part II

N.E.M.A. committee develops uniform cost system. Its use will enable the correct determination of costs with due regard for all the factors involved

By S. L. WHITESTONE and F. H. CORREGAN

COST accounting is as vital in the electrical manufacturing industry as engineering, and the business executive should be as familiar with cost accounting results as he now is with engineering results. The subject of cost accounting treated in the language and from the point of view of the business executive is thus of interest to executives who are not so much concerned with the mechanism used as they are in the results. The first part of a paper on this subject appeared in the issue of Sept. 10 on pages 515, 516 and 517. The last part is presented herewith. In commenting on this paper, which was originally presented at the annual convention of the National Electrical Manufacturers' Association, Alfred E. Waller, managing director of the association, said: "There is no more necessary and fundamental duty of the executive than to assure himself that the methods used in his accounting department are completely adequate."

APPLYING OVERHEAD

Even though overtime allowance, having been charged to direct labor, is segregated and definitely provided for in costs, an erroneous practice may be followed in applying overhead and may have a serious effect upon profits, because selling prices, based upon overstated costs, may be so high that truly profitable business may be turned away. That may happen when overhead is included in costs by means of a percentage added to direct labor and the percentage is added to overtime allowances, ignoring the fact that expense during overtime work ordinarily is not correspondingly higher, particularly as such work does not entail additional taxes, insurance and general administrative charges. The effect of this faulty practice is shown in Fig. 3, for the purpose of which it is assumed that overhead is included in costs at 100 per cent of direct labor and one dollar represents the maximum selling price obtained. Chart A shows the price based upon the true cost, and chart B the effect of pyramiding overhead on overtime allowances. This results in quoting a price of $1.03 and losing business.

INDIRECT MANUFACTURING EXPENSE

Indirect manufacturing expense presents many difficult problems of control and allocation to cost, upon the solution of which the success of the business may depend to a large extent. Control of expense is of utmost importance, and the time to exercise control is before, not after, expenditures are incurred. For this purpose a budgetary plan has been found to be a very practical and valuable aid. A successful plan has as a prerequisite a comprehensive accounting system and classification of expenditures, following which the budgets are itemized and actual expenditures recorded, so that direct comparisons of the budgeted and actual amounts of individual items may be made.

The problem of allocating expenses to the products to which they relate is an involved one, therefore susceptible to great error. Expenditures for direct material and labor can be definitely traced to specific units of

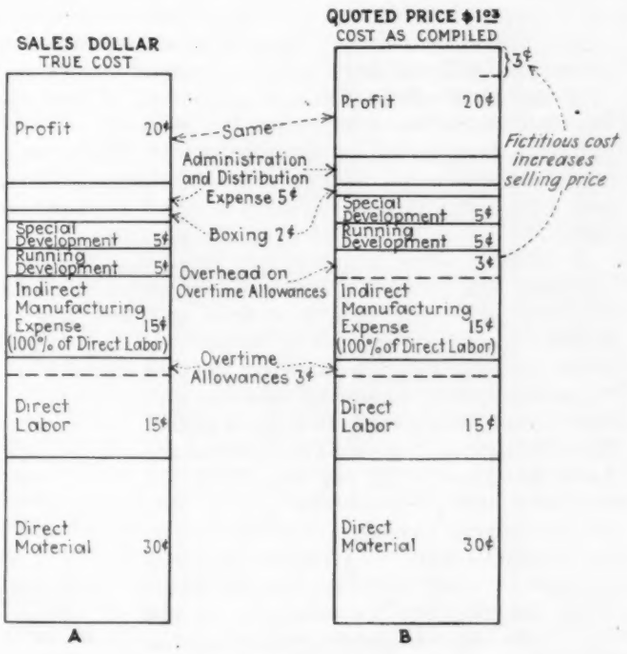


FIG. 3—PROPER APPLICATION OF OVERHEAD WILL PREVENT PYRAMIDING COSTS

TABLE II—EFFECT UPON OVERHEAD PERCENTAGE OF CHANGES IN MANUFACTURING METHODS

	Before Installing Conveyors	After Installing Conveyors
Direct Labor:		
Skilled workers	$80,000	$80,000
Laborers	20,000	.....
Total	$100,000	$80,000
Overhead (indirect manufacturing expense):		
Without conveyors	$100,000	$100,000
Conveyors	.....	10,000
Total	$100,000	$110,000
Per cent expense to direct labor	100	137.5
Inventory shortage revealed at end of year:		
Actual expense	.....	$110,000
Liquidated in costs ($80,000 at 100 per cent)	.....	$ 80,000
Not recovered	.....	$30,000

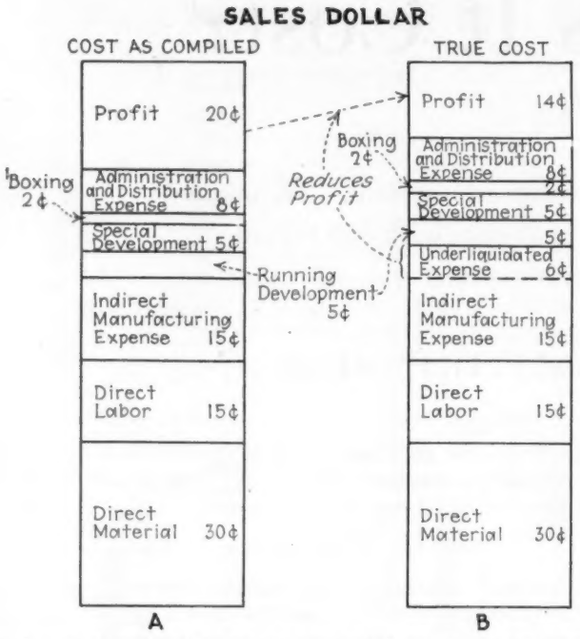


FIG. 4—ALLOCATING EXPENSES TO THE PRODUCTS TO WHICH THEY RELATE IS AN INVOLVED PROBLEM

output, but many items of expense cannot be, and they often apply with varying degree to a number of different sizes and kinds of product. A great deal of progress has been made toward improving the methods of allocation, but there is still much to be done. The work is important because of the influence which faulty practices may have upon profits. A case in point is shown in Table II.

A company which had employed laborers to transport materials and parts, so that skilled workers could be employed more continuously at their machines, has installed conveyor systems. The laborers had been treated in the accounts and costs as direct workers on the theory that because of their employment fewer skilled workers were required. The elimination of the workers reduced the direct labor payroll 20 per cent, while, on the other hand, depreciation, power, etc., for the conveyors resulted in an increase in expense of 10 per cent. Overhead had been included in costs at 100 per cent of direct labor, and this was not changed. At the end of the year an inventory shortage of $30,000 was revealed. The effect upon profits, selling prices having been based upon costs, is shown in Fig. 4. The case brings out three faults:

1. In having treated wages of laborers which were not applicable to specific units of products as direct labor. They could have been more effectively controlled if included as an item of expense.

2. In not having a record of expense liquidated in costs. This would have revealed the underliquidation beginning with the first month.

3. In having failed to review frequently the rates of overhead used in costs.

Another problem of expense allocation arises when products varying in size, type and quantity are manufactured in one department. An accurate allocation under such circumstances necessitates differentiation in the rates of expense. It may be found that with an average rate of 100 per cent the correct rate for one product should be 80 per cent and for another 140 per cent. In the absence of proper differentiation profits may be seriously affected. A case illustrating this is as follows:

TABLE III—DIFFERENTIATION OF OVERHEAD PERCENTAGES BY LINES OF PRODUCTS

	First Year	Second Year	Current Year
Direct labor	$150,000	$150,000	$150,000
Standards	100,000	75,000	50,000
Specials	50,000	75,000	100,000
Indirect manufacturing expenses	$150,000	$165,000	$180,000
Standards	80,000	60,000	40,000
Specials	70,000	105,000	140,00
Percentage expense to direct labor:			
Total	110	110	120
Standards	80	80	80
Specials	140	140	140
Used in costs	100	100	110
Underliquidated expense	0	$15,000	$15,000

A manufacturer who has a line consisting of standard types produced in substantial quantities and an off-standard or special line of which single units or very small lots are made has met with severe competition in the sale of standards, but has maintained a good total volume of business, consisting, however, more and more largely of specials. He is disturbed to find that, despite the satisfactory volume and his having adjusted the normal rate of overhead to accord with the prior year's experience, expense continues to be underliquidated. An analysis discloses the information printed as Table III.

The effect upon profits is shown in Fig. 5, and it is seen that:

(a) Chart B shows that the profits for the current year were lower than anticipated, because of the additional expense due to the relatively larger proportion of specials.

(b) Chart C indicates why competition in the sale of

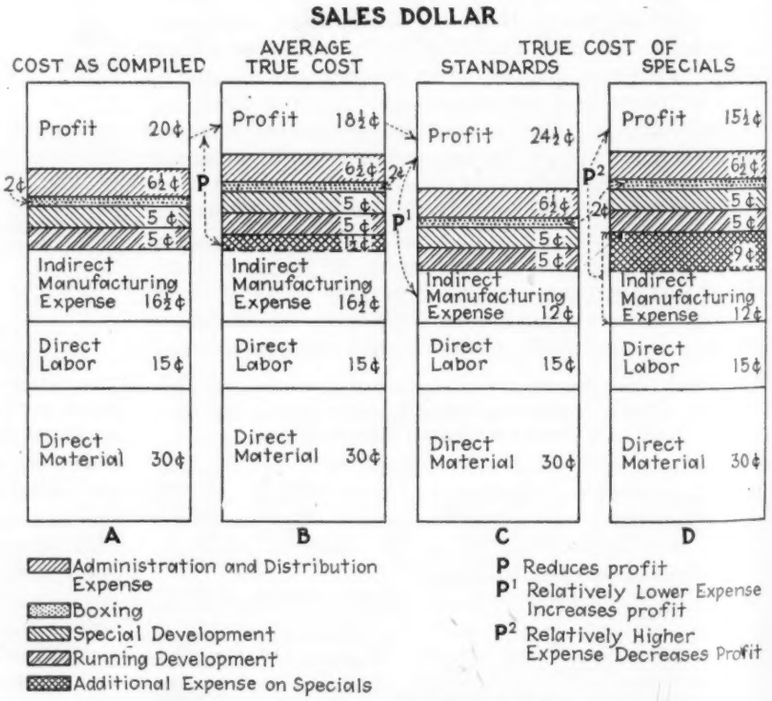


FIG. 5—EFFECT ON PROFITS WHEN EXPENSES ARE NOT ALLOCATED PROPERLY TO PRODUCTS VARYING IN SIZE, TYPE AND QUANTITY

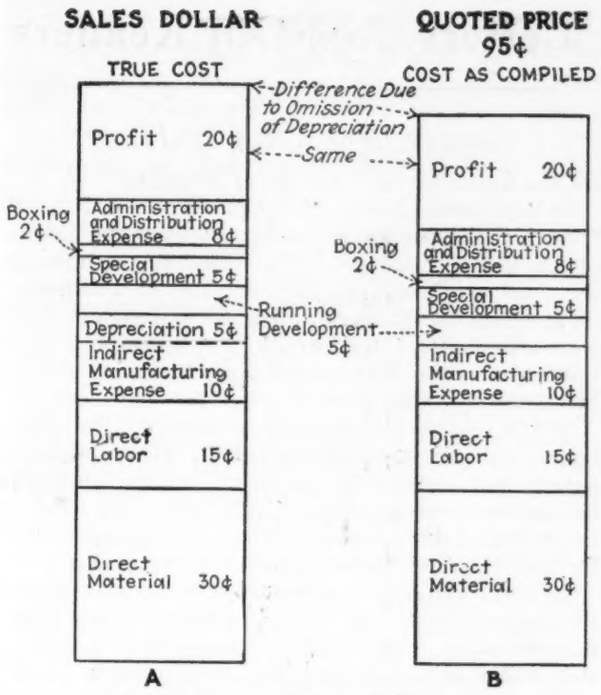


FIG. 6—EFFECT OF OMITTING DEPRECIATION

standards was increasingly severe. It will be seen that prices included a larger amount of profit than anticipated.

(c) Chart D reveals the fact that total profits were smaller than desired, because the specials were not contributing their quota.

(d) All of these conditions were due to failure to make proper differentiation in overhead.

The need for segregating running development expenditures incurred on account of standard lines of product and special development applicable to special products manufactured for specific customers' orders is as important as the proper differentiation in overhead just referred to. If the segregation is not made and the combined expenditures are spread over all products, the effect upon products may be visualized by referring again to Fig. 5. Assume that in the case of standards no special development is incurred and that for special it amounts to 10 cents. It will be seen that actually the profit on standards (chart C) would be 29.5, whereas that for specials (chart D) is reduced to 10.5 cents.

Whatever applies to indirect manufacturing expense is also applicable to general expense. In dealing with general expense these items should be considered:

(a) It should be so classified that it may be effectively controlled, and when budgets are used they may be fully itemized.

(b) Some indication should be had as to whether or not the amounts included in costs are adequate.

(c) Proper differentiation should be made according to standard and special products, and variations in the number of units or value per order and the number of orders or total business per customer.

Faulty methods of dealing with general expense will have the same unsatisfactory influence upon profits as in the cases of the other elements of cost. Furthermore, because general expense is so often included as a percentage of manufacturing cost discrepancies in the other elements may be compounded. This is true whenever any item is added as a percentage to a cumulative figure.

Faulty accounting and cost methods may lead to quoting, quite unintentionally, selling prices which are lower than required to cover total cost and yield, in the long run, a fair return on investment. Depreciation is an important element which often is not definitely provided for in costs. Yet just as surely as a stock of materials is gradually consumed in production so is the service value of manufacturing plant, the only difference being that replacements of plant may be long deferred. Consequently, the gradual exhaustion (depreciation) may not be definitely recognized and provided for in costs. The effect of this omission is shown in Fig. 6. Chart A shows what the selling price ought to be, while in chart B depreciation has been omitted from costs. For a number of years the profits of the company may seem to be at a satisfactory rate, but when, as is inevitable, the usefulness of the equipment is exhausted and the cumulative reduction in its service value has to be dealt with, the short-sightedness in having failed to provide for depreciation will become fully apparent in the profits and perhaps in finding that a price level has become established and cannot be easily raised.

The above cases demonstrate the important relationship between profits and accounting and cost problems. Each company working alone can deal with a problem when the need for meeting it, although perhaps long obscure, becomes apparent. But the quicker, surer and more economical way to accomplish results is through an exchange of ideas by those having problems in common and before faulty practices have had an opportunity to work to the detriment of the individual company and perhaps the industry at large.

Customer Wonders Why This Difference

WITHIN the last two years a consulting engineer found it necessary to take up his residence in three of our largest cities, each served by a different set of electric, gas and telephone companies. This man's experiences and impressions in obtaining service from the various utilities in the three localities are interesting because of the contrasting policies with respect to deposits and connection charges exacted before service would be rendered. As comparisons are odious, no names will be mentioned.

In the first city, two of the utility companies required the conventional $5 deposit and turned on service within 48 hours. The third company stipulated a connection charge, plus payment three months in advance, for the service it expected to render and made the connection two weeks later. In the second city, when electric service was applied for, this engineer was informed that his lights were already "on"; all that was needed was to put the lamps in the sockets. No deposit was required, not even an application blank to be signed; he simply gave the correct spelling of his name and went on his way in a happy frame of mind. At the next two utility offices it was different, however. At the application counter deposits, connection charges and advance payments were the principal themes of conversation that consumed the rest of the morning and left the engineer in no amiable frame of mind.

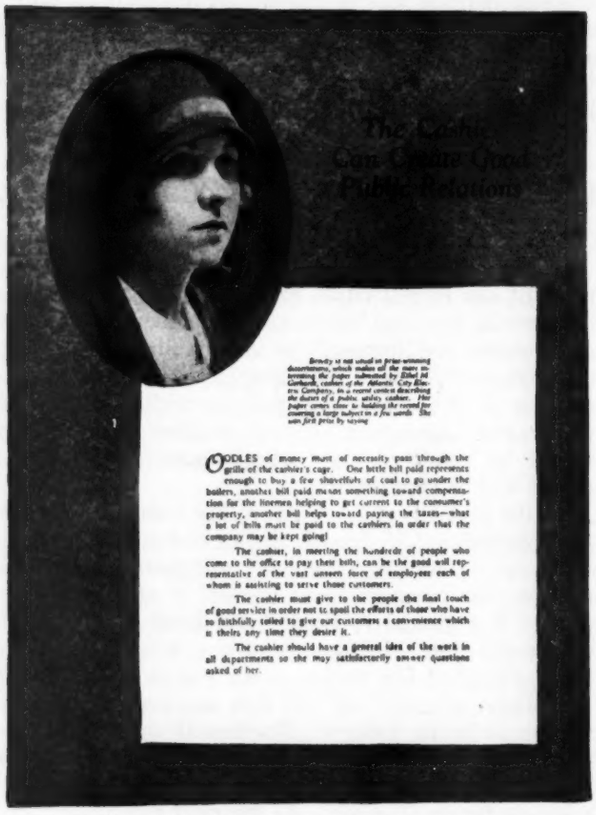
When he landed in the third and largest city of all three, he expected that each utility would exact its separate and individual pound of flesh. But in no case was a deposit asked for. All he had to do was sign a slip requesting service and give his street address. The electricity, gas and the telephone were all available the next

day. It is needless to say that this man harbors no grudge against the public utility companies in the latter city; he was given service, plus, at the start.

But why should there be this difference this engineer-customer wonders? In each locality all of the public utilities are prosperous, and their customers are average American citizens who are better than 99 per cent honest. He contends that there is no good reason why utility companies should indiscriminately exact guarantees, or advance payments for their services, and asks, "Why not adopt the policy that customers are honest until proved otherwise?"

Winning Customers to Prompt Bill Payment Idea

NEAR the cashier's window in the commercial offices of the various operating companies of the American Gas & Electric Company appears the prize-winning essay of Ethel M. Gerhardt. Arranged in the form of a poster, as shown in the illustration, this paper does its bit to assist in creating good public relations. It is pointed out that "One little bill paid represents enough to buy a few shovelfuls of coal to go into the boilers, another bill paid means something toward compensation for the linemen helping to get current to the consumer's property, another bill helps toward paying the taxes—what a lot of bills must be paid to the cashiers in order that the company may be kept going!"


The Cashier Can Create Good Public Relations
Directly or not ahead on prize-winning dissertations, which makes all the more interesting the paper submitted by Ethel M. Gerhardt, cashier of the Atlantic City Electric Company, in a recent contest describing the duties of a public utility cashier. Her paper comes close to holding the record for covering a large subject in a few words. She won first prize by saying
DOLLES of money must of necessity pass through the grille of the cashier's cage. One little bill paid represents enough to buy a few shovelfuls of coal to go under the boilers, another bill paid means something toward compensation for the linemen helping to get current to the consumer's property, another bill helps toward paying the taxes—what a lot of bills must be paid to the cashiers in order that the company may be kept going!
The cashier, in meeting the hundreds of people who come to the office to pay their bills, can be the good will representative of the vast unseen force of employees each of whom is assisting to serve those customers.
The cashier must give to the people the final touch of good service in order not to spoil the efforts of those who have so faithfully toiled to give our customers a convenience which it theirs any time they desire it.
The cashier should have a general idea of the work in all departments so she may satisfactorily answer questions asked of her.

TELLING THE PUBLIC THROUGH THE WORDS OF ITS EMPLOYEES HOW REVENUE IS USED

The prompt payment of current charges should be greatly increased by this method of publicity and appeal for co-operative assistance.

Letters from Our Readers

Service, Not Kilowatt-Hours

To the Editor of the ELECTRICAL WORLD:

In your issue of Aug. 20, page 362, there is a letter from J. H. Wickman supposedly answering the questions of "A Young Engineer." Mr. Wickman, in answering the third question, regarding the use of readiness-to-serve charges, asks another question as follows: "Why try to introduce a number of new units, such as the stand-by charge, load factor, power factor, diversity factor or any other factor?"

Mr. Wickman further goes on to say: "The packing houses sell their meat by the pound; oil companies distribute their product by the barrel. Each industry has its overhead expenses, stand-by charges and what not, but it is glad to add these to the basic unit without further complicating the public's thinking apparatus."

It is not fair to compare the electrical industry with the packing houses or with any other ordinary kind of merchandising. The boast of the electrical industry is that it sells service and not just kilowatt-hours. Such is not the case, however, as long as only a kilowatt-hour charge is used, for in such case the service is given away free, while the electric company tries to make up for it in the charge for the kilowatt-hour. As a result, 30 per cent of the customers pay not only for their own service but for the service rendered to the other 70 per cent.

Both Mr. Wickman and the "Young Engineer" would do well to read the booklet put out by the American Gas Association, entitled "Better Forms of Rates for Gas," in which the question raised by Mr. Wickman is answered on pages 15 and 16. The statements therein are even more appropriate as regards electric residence service, for while a gas company has a ratio of only about three to one between its production cost per unit and its selling price, many electric companies have a ratio as high as ten to one between the cost of a kilowatt-hour and the revenue received per kilowatt-hour from the customer.

New York, N. Y. C. S. REED.

* * * *

Factory Lighting in Terms of Reflection Coefficient

To the Editor of the ELECTRICAL WORLD:

I have read with interest the article entitled "Does the Factory Lighting Star Need Hoisting?" by Joseph F. Becker, on page 420 of the ELECTRICAL WORLD for Aug. 27. There has been considerable talk recently about increasing the intensity of illumination in industrial plants to higher levels, and there seems to be a general idea among many that there is some definite illumination intensity for industrial plants in general above which it is uneconomical to make further increases.

The facts of the case, of course, are determined by the reflection coefficient of material worked on. Thus a printing plant working on white paper having a reflection co-efficient of 80 per cent would not be called upon to go above 6 foot-candles (5 ÷ 0.80), whereas an automobile-body plant, working on painting black bodies, having a reflection coefficient of 2 per cent, would require 250 foot-candles (5 ÷ 0.02). D. H. TUCK,

Electrical Engineer.

Holophane Company Engineering Department,
New York, N. Y.

Digest of Electrical Literature

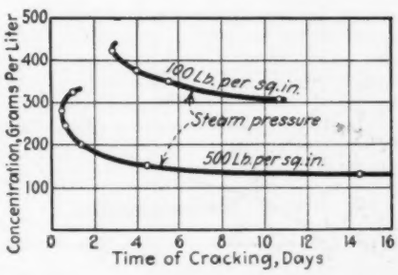
Transmission, Substations and Distribution

Voltage Regulation of Short Transmission Lines.—C. M. LONGBOTTOM.—In an endeavor to determine a method less academic than that used in most textbooks for the mathematical and graphical solution of problems of voltage regulation on short transmission lines, the author has developed a device of his own. It is essentially a modification of the Mershon diagram. It differs from the original diagram of Mershon in that radial power-factor lines are added. These represent the loci of the receiver voltage vectors to be found. The horizontal scale is that of voltage circles expressed in percentages. It is stated that the method is rapid and, if a reasonably large scale is used, is accurate for all practical purposes and offers a ready solution of the problem as it usually appears in practice; that is, given the receiver load in kva., the power factor and supply voltage, and required to determine the receiver voltage and line drop.—*Electrical Engineer (Australia)*, July 15, 1927.

Underground Substation. — K. SWOBODA. — A new substation had to be built for the supply of the central part of Leipzig since the existing equipment was antiquated and insufficient to cover the rising demand. Lack of a suitable street-level site forced the city to erect the new station underground. This fact, combined with the large output of the plant, make the installation one of the largest of its kind. Incoming three-phase cables supply 10,000-volt service from the central station. Ten rotary converters of 2,000 kw. capacity each receive 355-volt, six-phase current from ten 2,130-kva. transformers. Each set has, in addition, an induction voltage regulator with a substation range of 50 volts. Transformer and regulator are placed below each rotary, while the high-voltage equipment and the 10,000-amp.-hr. storage battery are placed on either side of the machines. Two large suction fans provide the necessary ventilation. Their capacity is sufficient to change the entire air volume in the station fourteen times in an hour.—*Elektrotechnische Zeitschrift*, July 28, 1927.

Hydro-Electric Development and Steam Equipment

Embrittlement of Boiler Plate. — S. W. PARR and FREDERICK G. STRAUB.—The authors have defined embrittlement as the loss of ductility, irrespective of the type of cracking, and the production of intercrystalline cracking in the absence of caustic. The general contention of the present investigation has been that strain and chemical action produce this type of cracking in a normal plate. The chemical action in boilers is brought about by the presence of sodium hydroxide since no boiler operating with low sodium hydroxide and high sulphate has ever encountered these difficulties. The efforts of the authors have been diverted toward the explanation of this cracking in boilers. They have not tried to explain all cases of intercrystalline cracking. For the purposes of the discussion, embrittlement is limited to that condition which is characterized by the intercrystalline cracking of normal boiler plates in the riveted area. The results of laboratory tests indicate that for steam pressures up to 150 lb. per square inch normal boiler plates will crack when stressed above the yield point in the presence of a sodium hydroxide solution of a concentration of 20,000 grains per gallon. Solutions of other salts found in the boiler have no effect on the steel



EMBRITTLEMENT CURVES SHOWING RELATION OF SOLUTION CONCENTRATION TO TIME OF CRACKING

under similar conditions. The presence of sufficient sodium sulphate with the sodium hydroxide stops the cracking. In order to obtain results which might be correlated with operating conditions of boilers using high steam pressure, apparatus was designed which would allow tests to be conducted at pressures up to 1,500 lb. per square inch. Tests were run at 100 lb. and 500 lb. steam pressure, the results being indicated in the accompanying figure. The tension on the specimens was 54,000 lb. per square inch. The curve at 500 lb. pressure shows that over a prolonged period it is not unreasonable to assume that cracking could take place at a concentration as low as 80 grams per liter. The effect of total stress on the time rate of the cracking, the effect of varying compositions of the steel and the result of previous heat treatment and other factors offering variations in the results are considered. The mechanism of embrittlement as related to chemical changes leads to a suggestion for the prevention of this deterioration. The authors conclude that for normal pressures it is sufficient to adhere to the A.S.M.E. recommendations for boilers. —*Engineering (England)*, Aug. 12, 1927.

Recent Progress in Hydro-Dynamics. — G. DARRIEUS. — In the judgment of the author, hydro-dynamics, largely because of the recognition of the necessity for taking into account the resistance to motion experienced by totally immersed solids and other phenomena of viscosity, has approached more nearly to the practical science of hydraulics. As matters now stand, nothing would appear to justify the discredit hitherto attached to classical hydrodynamics, since the achievements of recent years has gone far toward justifying it and its findings. It is stated, however, that if the elementary laws determine the motions of real fluids, and the differential equations in which they are embodied can no longer be considered doubtful, the solution of even the simplest problems leads almost always to insurmountable difficulties in integration. The structure of these laws, however, is such that by simple dimensional reasoning the infinite variety of problems presented by nature can be classified by groups with corresponding solutions. It has been the endeavor of the author to point out the methods which may be used for the simplification of these apparently complicated and extremely difficult equations and to assist in the work of rendering more practical the fundamentally unquestioned science of hydrodynamics. The determination of stream lines has been effected through the study of the electric field in an electrolytic bath in which stands a cylindrical conductor having a cross-section similar to that of the investigated body, and in a manner similar to that by which stresses due to the torsion of a prism of any section may be deduced from the study of soap films deformed by a slight air pressure. Blade forms and draft tube proportions are to be investigated later.—*Engineering (England)*, Aug. 26, 1927.

Units, Measurements and Instruments

Cambridge Magnetic Bridge Permeameter. — A commercial form of the magnetic bridge of the Iliovici type has been developed recently. In this permeameter the currents in two coils, providing the magnetomotive forces of a magnetic circuit containing the specimen, are adjusted until there exists no magnetic potential difference between a selected pair of fixed points on the specimen. The absence of magnetic potential is determined by pressing a yoke down upon the two points. At the proper adjustment the approach of the yoke induces no current in a search coil wound on the specimen and connected with a galvanometer. The permeameter used does not require careful machining of the specimen to reduce

the reluctance of the joint; neither need the yoke to be of low reluctance.—*Engineering (England)*, Aug. 26, 1927.

Illumination

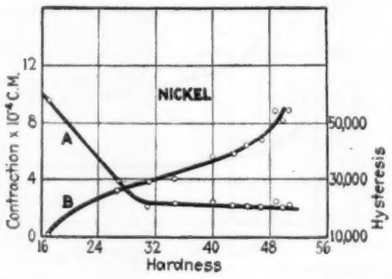
Photographic Lighting with "Mazda" Lamps.—R. E. FARNHAM and K. M. REID.—This bulletin represents an endeavor to explain the best method of applying light for the purposes of photography and offers suggestions on wide range of lighting effects which can be produced with "Mazda" lamps and suitable equipment, showing the photographic rendition of colors obtained with different emulsions and filters. The individual requirements of portrait photography and commercial work in regard to the illumination of the subjects being photographed and in connection with the supply of illumination for the enlarging and printing processes receive careful attention. Methods of obtaining light control with surfaces and materials of different types and a discussion of such factors entering into photographic work as the sensitivity of plates to light of different wave lengths, the reflecting properties of various surfaces and the characteristics of translucent materials have received attention in the appendix. — *Bulletin, National Lamp Works*, July 20, 1927.

Heat Applications and Material Handling

Suggests Annealing for Welded Pipe.—J. L. AVIS.—It is the contention of the author that an important phase of the problem of successful electric arc welding of structural steel and of plates for tanks, penstocks and water-supply pipes has been overlooked. The physical condition of the weld itself and of the metal adjacent thereto points to the tendency to failure at the weld of large-diameter pipes when subjected to destructive hydrostatic pressures. The author is of the opinion that the stresses developed in pipe in the welding process are of considerable magnitude and that the cystalline structures adjacent to the weld suffer a considerable alteration with regard to crystal sizes and arrangement of the constituents influencing the physical properties of the metal in regard to ductility, elasticity, tensile strength and hardness. Experiments were undertaken to determine the extent of the impairment of the strength of the pipe. It is pointed out that specifications covering the fabrication of structural steel, drawn up many years ago, require that when it is necessary to heat a member for bending purposes the entire member must be subsequently annealed. This requirement was introduced because members which were bent without subsequent annealing often failed in service. It is suggested that electric annealing furnaces with pyrometer control lend themselves most readily to the normalizing process and that suitable rolls for restoring the contour of any sections which may warp during the heat treatment might be necessary. Pipe taken from the annealing furnace could be immediately run through the contour-restoring rolls and then to the coating tanks. A number of micro sections accompanying this article illustrate the contention of the author in regard to weakened crystalline structures near welding sections.—*Iron Age*, Aug. 25, 1927.

Electrophysics, Electrochemistry and Batteries

Attempt to Correlate the Joule Magnetostrictive Effect and Hysteresis Loss in a Series of Nickel Strips. — S. R. WILLIAMS. — The magnetic properties of a group of eleven strips of nickel, all cold-rolled from the same heat, were studied by the author. These strips were rolled to varying thicknesses, and a series of specimens of different degrees of hardness were thus obtained. It was assumed that if the change in length of these strips for any given field strength and the hysteresis loss were plotted against the hardness values of the same strips, the curves thus obtained ought to show a similarity if



RELATION BETWEEN HARDNESS AND HYSTERESIS LOSSES AND CONTRACTION

the parallelism is a constant for all factors imposed on nickel. The accompanying figure shows the curves plotted from the results of these observations. The values for the changes in length of the various strips were those obtained when a field strength of 57.7 gauss was applied to each of the specimens of nickel. The same relation would hold for any other field strength. The hystersis loss per cubic centimeter per cycle is for B (maximum) carried to a point of saturation. Curve A presents the relation between the hardness and the contraction of the various strips, while curve B is the corresponding curve for the hysteresis losses. The results appear to indicate that the hardness factor does not produce a parallelism between hystersis and magnetostriction.—*Science*, March 25, 1927.

Magnetism and Magnetic Materials.—G. C. MARRIS.—A compliation of the results of numerous experiments regarding the magnetic properties of various ferromagnetic materials is offered in connection with an explanatory survey of both theory and data. The effects of impurities, preparation, annealing, etc., are discussed and high frequency and superimposed fields considered. The values of the hysteresis loops are given. The action of a number of samples of ferromagnetic material under superimposed magnetization, showing the permanent magnetization, the alternating magnetization and reversible permeability, has been tabulated.—*World Power (England)*, August, 1927.

Traction

Electrification of Austrian Railways.—P. DITTES.—This article constitutes the 1927 annual report of the post-war railway electrification of the Austrian Republic. The scarcity and high cost of coal in this new republic and the abundance of natural water resources made it a national necessity to electrify the entire railway system. To insure perfect uniformity, the federal government created an electric railway section and drew up an extended program, covering 25 years, during which time all main roads are to be changed over from steam to electric traction. In spite of adverse political and financial conditions, the work has progressed according to the planned program, with the result that today more than 350 miles of roads is under electric operation. The program provides not only the electrification proper, with trackage, tunnels and rolling stock, but for the erection of hydro-electric plants for the power supply as well. — *Elektrotechnik und Maschinenbau*, July 10, 1927.

Telegraphy, Telephony, Radio and Signals

Holweck Demountable-Type Valve.—C. F. ELWELL.—Demountable tubes or valves used for radio broadcasting purposes must be connected to a vacuum pump capable of continuously maintaining a vacuum sufficiently high for practical working purposes. A rotary molecular pump involving certain advantages which tend to adapt it to the commercial operations of demountable valves is described in connection with a tube used for transmitting purposes. The latter has the advantage of using renewable filaments which may be replaced at slight cost combined with the ability to carry large overloads. The essential parts consist of a glass or quartz insulating piece for connecting the valve to the pump, a water-cooled anode, upper glass-insulating piece with grid connection and a water-cooled head carrying the grid and filaments. These valves are of 10 kw. to 30 kw. capacity. It is necessary to supply an adequate quantity of water for circulation through the anode and filament head, the vacuum pump must be operated for some time previous to operation, and the molecular pump for maintaining the vacuum must have achieved proper operation before the tubes may be submitted to high potentials. The author foresees the many advantages of this type of valve as producing a greatly increased use for broadcasting work.—*Paper presented to Institution of Electrical Engineers (England)*, August, 1927.

News of the Industry

Bellagio Session of I. E. C. Draws 250

First Week's Discussions Lead to No Definite Conclusions, but Are Continued—Delegates from This Continent Head Three of the Thirteen Committees

LEAVING Como, Italy—the home of Volta—by boat for Bellagio on Sunday afternoon, Sept. 4, the delegates to the International Electrotechnical Commission assembled in the Hôtel Grand-Brétagne at the latter city at 6 p.m., when their sessions were formally opened by President Guido Semenza. Addresses were made by L. Lombardi, president of the Italian committee; by representatives of two of the Italian ministries of state, and by the Mayor of Bellagio. Twenty-one nations were represented by the 250 delegates assembled. Of these 21 were Americans and one was a Canadian. The Americans were C. H. Sharp of the Electrical Testing Laboratories, chairman of the United States National Committee; Dr. C. O. Mailloux, honorary president of the I.E.C.; Theodore Beran, S. E. Doane, H. M. Hobart and F. W. Peek of the General Electric Company; W. M. Bradshaw, Francis Hodgkinson and C. E. Skinner of the Westinghouse Electric & Manufacturing Company; J. H. Dellinger and J. F. Meyer of the Bureau of Standards, Washington; Profs. W. F. Durand, D. C. Jackson, A. E. Kennelly and P. M. Lincoln; L. L. Elden of Boston; R. D. Johnson, L. B. Marks and S. G. Rhodes of New York; W. G. Kelley of Chicago, and E. D. Tanzer of Philadelphia. Canada's delegate was John Murphy of the Department of Railways and Canals, Ottawa.

Of the thirteen committees of the I.E.C., three were headed by delegates from this side of the Atlantic—the committee on nomenclature by Mr. Sharp, that on rating of rivers by Mr. Skinner, and that on prime movers by Mr. Murphy.

At the sessions on Monday the experts' papers on prime movers and switch ratings were presented. The committee on electric meters completed its work, recommending further study of problems related to accuracy, insulation tests and sizes. No definite action was taken by the committee on the rating of electrical machinery, which met on Tuesday and Wednesday with a large attendance; nor had definite conclusions been reached up to the end of the first week by the committees on insulating oils, voltages and international vocabulary. Discussions by these committees were still going on, however.

At the dinner given to the delegates by the Italian committee addresses were made by Messrs. Lombardi, Kennelly, Murphy and an Australian representative, John P. Tivey of the Australian General Electric Company. The dinner was graced by the presence of a large number of ladies, and Signora Semenza and Mrs. Sharp spoke for them.

On Tuesday, Sept. 13, the delegates left on a nine-day tour to Milan, Venice, Florence and Rome. The plenary meeting of the commission will be held in Rome on Thursday, Sept 22, after which additional tours have been arranged.

International Commission on Illumination Meets

From Aug. 31 to Sept. 3 the International Commission on Illumination met at Bellagio, Italy. Ten nations participated, seven of the 67 delegates being Americans, some of whom were also delegates to the committee and plenary sessions of the International Electrotechnical Commission. Forty-five papers were presented in ten sessions, subjects covered including automobile headlighting, factory lighting, photometric methods and international definitions. Nine new technical committees were formed, these including committees on diffusing glassware, signal lenses, daylight motion pictures, street lighting and glare research. Edward P. Hyde, formerly director of research at the National Lamp Works of the General Electric Company, Cleveland, and now residing in France, who had been president since 1921, resigned, and C. C. Patterson, director of the research laboratory at Wembley, England, was elected to succeed him.

The next meeting of the commission will be held in the United States in September, 1928.

World Power Conference for Germany in 1930

The next World Power Conference will be held in Germany in 1930. A definite decision to that effect was reached last week at the international executive committee meeting in Cernobbio, on Lake Como, Italy. It also was decided to hold a sectional meeting in Tokio in 1929. Tentative arrangements had been made to hold the next conference in Italy, but the Italian committee explained that the conference could be held more profitably in Italy at a later date when its hydro-electric program shall have developed somewhat further.

The foregoing information was contained in a cablegram received by O. C. Merrill, executive secretary of the Federal Power Commission, who is the chairman of the American committee, from H. J. Pierce, the vice-chairman, who represented the American group at the executive committee meeting. Mr. Merrill was unable to be present at that meeting.

Potomac and Public

Desirability of a Thorough Investigation to Clear up Factors of Every Nature Affecting the Project—What Government Exploitation Involves

INVESTIGATIONS thus far in connection with the application of the Potomac River Corporation for a preliminary permit in the Washington-Harper's Ferry area indicate that the public question now involved is whether or not a careful study into the merits of the project by a competent agency is desirable in the public interest. The investigation would include consideration of all intangible as well as tangible factors affecting the development. Among the intangible considerations are such questions as have been raised by the National Capitol Park and Planning Commission, but it is apparent that no final judgment regarding the relative merits of a park in the vicinity of Great Falls as against some kind of a power development can possibly be rendered until this investigation shall have been made.

The data already gathered by the District Engineer point to the desirability, in the interest of all concerned—those opposed to the development as well as those who favor it—of having a preliminary permit extended to a competent applicant. The development proposed by the Potomac River Corporation is very much larger than that contemplated by the Norris bill. Much of its support came from the desire to develop power for the use of the government itself, which is a large consumer of electricity in the city of Washington. The development now proposed, however, is so large that only a fraction of the contemplated output could be put to use by the government itself. To make the large development feasible requires that virtually all of the output be marketed. Were the government to develop the maximum resources of the Potomac it would have to embark in the power business on an extensive scale outside the limits of the District of Columbia. Moreover, to conduct this power business efficiently would require on the part of the government agencies a degree of freedom from restrictive rules not often encountered in governmental operations. The government would be required to

interchange energy on a constantly varying basis and under contracts possessing a considerable degree of flexibility so far as concerns their details. While it is possible that a governmental corporation could be created and endowed with extremely elastic powers, it is highly improbable that Congress would agree to such a charter. There is also doubt whether the executives of such a corporation could conduct their affairs without interminable difficulties with the Comptroller-General and other accounting officers.

Technical Advance Told of at Del Monte

Opening Sessions of Pacific Coast Session of A.I.E.E. Deal with Progress in the Art of Communication and with Results of Researches

GOOD technical sessions, a well-arranged students' program and enjoyable social activities gave the three hundred and more attendants at the Pacific Coast convention of the American Institute of Electrical Engineers, held at Del Monte, Cal., on Sept 13 to 16, ample reward. An innovation was the conference of student branches on Tuesday and a technical session at which nineteen papers were presented and discussed by students of Western branches.

On Wednesday morning, Sept. 14, a regular session was held at which communication and carrier-current papers were presented and discussed. J. N. Chamberlain outlined surveys and studies made by the telephone company in developing a fundamental plan of toll systems designed to serve for several years in the future. E. Jacobson and F. O. Wheelock presented a paper dealing with a tandem-toll system for handling large volumes of short-toll business. This system uses direct toll lines from central office exchanges to a central tandem station at which manual or automatic operation may be installed. In a discussion of these papers members stressed the importance of cost analysis, traffic studies and influence of future developments. It was reported that toll telephone business was increasing rapidly because of improved service and the greater convenience in making calls.

A paper on carrier-current relay protection was given by J. A. Fitzgerald. This system utilizes a vacuum-tube balance type of differential protection with carrier-current control of pilot relays at each end of a line section. Tests have been made on a utility system which indicates great possibilities for the new relay system. In the final paper of the session T. A. E. Belt presented a paper dealing with the manufacture of coupling condensers for carrier-current systems. Discussion brought out uses of carrier current for signals, remote indications, series street-lighting control and supervisory operations. Confidence was expressed by Dr. L. F. Fuller that the vacuum-tube and carrier systems would find many applications in industrial fields.

At the sessions just noticed President Bancroft Gherardi presided and made an address in which he traced the development of the Institute into a decentralized organization with something for all members to do or contribute. Past-Vice-President P. M. Downing was chairman of the convention and introduced President Gherardi.

At the Wednesday afternoon meeting several valuable research papers were presented. L. E. Reukema calibrated a sphere gap against frequency and found that flashovers occurred at lower voltages between 20,000 and 60,000 cycles than at 60 cycles, but at 60,000 cycles the calibration was constant. The author gave details of his measurements and calibration methods, in response to questions, and gave a physical conception of the phenomenon he described.

A fine paper on the space charge around a conductor in corona was presented by Prof. J. S. Carroll and J. T. Lusignan, Jr. They found that a rectification effect occurred and that a change in polarity of the space charge occurred at the value of voltage beyond which the quadratic corona law of Peek was invalid. Tests on 220-kv. transmission lines showed the same results as laboratory tests.

A mathematical research on transient oscillations on double-circuit, three-phase power lines was presented in a paper by Yoshio Sotoh. Three types of waves were described for their practical calculation. Those who discussed this and the preceding papers included J. P. Jollyman, H. T. Plumb, R. E. Pierce and R. J. C. Wood.

An address on the future of electrical development was delivered on Wednesday evening by Dr. Harris J. Ryan. He said that the use of the electron jet has made possible measurements heretofore impossible and will aid in the study of lightning and other high-speed phenomena. President Gherardi at this session traced the development of communication up to the present time, stressing particularly the transatlantic communication which has linked the two great English-speaking nations.

Illuminating Engineers' Program Is Ready

Chicago's Edgewater Beach Hotel will be the gathering place for the twenty-first annual convention of the Illuminating Engineering Society, to be held on Oct. 11 to 14. Ample entertainment, including outdoor sports and the banquet, entertainment and dance on the evening of Thursday, Oct. 13, will be provided. The business program follows:

TUESDAY, OCT. 11

Morning.—Address of welcome, John F. Gilchrist; president's address, H. H. Higbie; report of general secretary, L. H. Graves; report of committee on progress, F. E. Cady; report of committee on street lighting, P. S. Millar; "Light Distribution Requirements for Asymmetric Ornamental Street-Lighting Units," T. W. Rolph and A. J. Sweet.

Afternoon.—"Variation of Natural Illumination," J. E. Ives; "A Preliminary Report of the Measurement of Variation of Energy in the 'Vita Spectrum' of the Sunshine in Kansas," J. S. Hughes; "Spectral Characteristics of Light Sources and Window Materials Used in Therapy," W. W. Coblentz; "Color Classification of Natural and Artificial Illuminants," Norman Macbeth; "Hot-Cathode Discharge in Neon," J. D. Forny and C. G. Found.

WEDNESDAY, OCT. 12

Morning.—"Simplified Lighting Code for Factory Inspectors," S. G. Hibben; "Technique of Economic Studies of Lighting in Industry," J. W. Barker; "Symposium on Office Lighting," directed by G. H. Stickney, R. B. Burton, F. Lee Farmer, J. L. Stair, C. A. Stone, Davis H. Tuck and A. F. Wakefield; "Improved Designs for Stage-Lighting Equipment," W. C. Brown and F. M. Falge.

Evening. — "Demonstration of Rating Scheme for Residence Luminatives," Ward Harrison; "Light for Ornament," A. L. Powell; "Adapting Period Designs to Modern Illuminants," M. Luckiesh.

THURSDAY, OCT. 13

Morning. — Lighting Service Committee Session: "Lighting Practice—Past, Present and Future," James E. Davidson; "Discussion of Lighting Service Manual," J. M. Hickerson, H. W. Derry and J. C. Fisher. Parallel Laboratory Session: "Standardization of Methods of Heterochromatic Photometry," A. H. Taylor; "Photometry and Watt Measurements of Incandescent Lamps on Ordinary Alternating-Current Circuits," C. H. Sharp and E. D. Doyle; "A Photo-Electric Cell Photometer," Charles Deshler and Henry Schroeder; "Results of Practical Experiences in Photo-Electric Photometry," W. F. Little and C. E. Horn; "Further Developments in Photo-Electric Photometers," C. H. Sharp and H. A. Smith.

Afternoon.—Joint Session with National Committee for Prevention of Blindness: "Intensity of Light and Speed of Vision, Studied with Special Reference to Industrial Situations, Part II," C. E. Ferree and Gertrude Rand; "Four Fundamental Factors in Vision," P. W. Cobb and F. K. Moss; "How We Learn to See and How We Learn Some Other Things," W. T. Bovie.

FRIDAY, OCT. 14

Morning.—"Railroad Yard Lighting," H. E. Mahan and R. J. Swackhamer; "Lighting of Airports and Airways," W. P. MacCracken, Jr.; "Present Status of Lighting for Aviation," P. R. Bassett, R. W. Cost, E. A. Leinroth and H. C. Ritchie; "Daylighting in Multi-Story Industrial Buildings," Andrew Vogel, Frank Benford, W. C. Randall and A. J. Martin.

California Men Meet Again on Colorado Problem

In preparation for the reconvening of the conference of state governors on the Colorado River compact, set for Sept. 19 in Denver, a meeting was held by the California Colorado River Commissioners at Los Angeles on Sept. 10. No formal statement was forthcoming, but John L. Bacon, chairman of the commission, said that California will not recede from her stand regarding the apportionment of water from the river. The meeting at Los Angeles did not touch upon the states' rights resolution presented by United States Senator Pittman of Nevada, which appeared to meet with the approval of all the states except California.

Reservation Indians Favor Power Dam

Ask Federal Power Commission to Grant Permit in Wisconsin—Devil's River Project — Engineers Approve Skagit River Dam Design

REQUEST has been made to the Federal Power Commission by the Menominee Indians to issue a preliminary permit to the Wisconsin Power & Light Company for the hydro-electric project on the Wolf River in Wisconsin within the boundaries of the Menominee Indian Reservation. The Indians voted 105 to 7 at a tribal meeting to take that action. The power company previously had agreed not to file an application for a license unless an agreement was reached with the Indians as to the payments they would receive in connection with the development. The granting of the permit has been objected to by outside interests on the ground that the Indians are opposed to it. It developed at the meeting that the Indians were almost unanimously in favor of allowing the resources of the river to be used in the production of revenue. Appeals have been made to the Indians by fishermen who are anxious that the river be left in its natural state, but as they were unwilling to offer any inducement comparable to the returns which the tribe would receive from power development, there was little support for that point of view. It is also pointed out that development will interfere very little with the use of the river by sportsmen.

James C. Kennedy of Dallas, Tex., has filed with the commission a declaration of intention to build seven dams and power houses on Devil's River, a tributary of the Rio Grande in Val Verde County, Tex. The seven dams will vary in height from 14 ft. to 48 ft. They will create storage ranging from 1,800 acre-feet to 15,350 acre-feet. The dams are to be built over an area of 17 miles beginning 4½ miles above the point of confluence of Devil's River with the Rio Grande. This scheme of development will make 3,650 hp. available.

The design of Seattle's multi-arch dam in the Skagit River has been approved by the staff of the commission and will be laid before that body itself at its next meeting for final approval. This is one of the most important high dams to come before the commission up to the present time.

A license has been issued to the Kassan Gold Company for a 200-hp. power project on Harris Creek, Alaska.

California has 140 applications pending before the commission, Idaho 37, Alaska 30, Arizona and Colorado 28 each, Oregon 27, Montana 26, Washington 24 and Utah 18. The total number of active applications at the end of the fiscal year was 483, representing 20,525,773 hp. of primary capacity.

Deplore Agitation for Public Ownership

Speakers Before New England Division, N.E.L.A., Ask Industry to Work Hard to Defeat the Muscle Shoals Boulder Dam and Similar Plans

FIVE HUNDRED members and guests of the New England Division of the National Electric Light Association gathered this week at the Hotel Griswold, New London, Conn., in the nineteenth annual convention of the organization, the program including addresses by President H. T. Sands of the national body, Managing Director Paul S. Clapp, Representative Charles A. Eaton of New Jersey, J. F. Owens, chairman of Public Relations National Section, N. E. L. A.; W. S. Vivian, chairman public-speaking committee; E. S. Fitzpatrick, United States Chamber of Commerce, Washington; Major H. S. Bennion, director of engineering, N.E.L.A.; E. C. Stone, chairman Engineering National Section; Earl Whitehorne, commercial editor ELECTRICAL WORLD, and H. W. Derry, chairman national competitive power committee.

President W. P. Schwabe in his opening address on Monday evening stressed the economic problems of the industry and the need of cultivating markets on existing lines. President Sands, Managing Director Clapp and Representative Eaton discussed present efforts to put the government into the power business and urged the industry to work to its utmost ability to prevent any congressional action at the next session in favor of federal water-power development or the entry of the government into the electrical service business at Muscle Shoals, Boulder Dam, in the Columbia River basin or in the St. Lawrence Valley.

A largely attended session of the women's committee was held Tuesday morning, under Miss A. M. Baker of Hartford as chairman, public relations, education and home service work being the major topics. The session closed with an address on electric service in the home by Anna Steese Richardson of the Better Citizenship Bureau.

At a commercial session on Wednesday Earl Whitehorne challenged the industry to push forward a nation-wide commercial development movement to bring about the early doubling of energy used in the home. He dwelt upon the small amount of residential use of electricity when contrasted with the industry's resources and possibilities. Mr. Derry emphasized the vital problem before power engineers to maintain their hold upon industrial service in face of the competition of prime-mover manufacturers.

An engineering session was held on Wednesday at which the work of the national body was outlined and an address featuring the importance of research was given by L. A. Hawkins of the General Electric Company. At a joint accounting and engineering session on Thursday C. L. Edgar, president Boston Edison company, and W. C. Bell, general manager Narragansett Electric Lighting Company, Providence, were scheduled to speak.

N.E.M.A. Meeting Draws Prominent Men to Association Island, N. Y.

Left to right:
1. D. R. Bullen.
2. R. H. Goodwillie
3. D. Hayes Murphy.
4. S. L. Nicholson.
5. C. R. Bates.
6. A. H. Timmerman.
7. N. A. Wolcott.
8. C. L. Collens.
9. E. M. Herr.
10. B. Dinsmore.
11. R. J. Russell.
12. L. B. F. Raycroft.
13. J. W. Perry.
14. H. B. Crouse.
15. Gerard Swope.
16. Fay Woodmansee.
17. M. A. Troy.
18. Francis E. Nagel.
19. J. F. Kerlin.
20. H. W. Young.
21. A. E. Waller.

To Sell One More Kilowatt-Hour a Day

N.E.L.A. Commercial Section Committees Concentrate on Rewiring, Trade Relations and Sales Methods—Discuss Industry-Wide Program—Water-Heating Survey

UNDER the chairmanship of J. E. Davidson, the Commercial Section of the National Electric Light Association got away to an early start this year when the various committees in session at the Edgewater Beach Hotel, Chicago, last week formulated plans for still more intensive commercial activity on the part of the electric utilities. Of particular importance to the entire electrical industry was the attention given to the problem of rewiring old houses, thereby to remove one of the chief obstacles retarding sales of electrical equipment to and increased energy consumption by residential customers. Better trade relations also as a means of broadening and increasing the electrical market came before the meeting, and action will be taken through joint conferences of electrical and retail trade associations looking to a mutual understanding.

The national movement to sell one more kilowatt-hour a day to every domestic user received further impetus from Chairman Davidson, who stressed the importance of increased energy sales and urged development of sales methods which would accomplish this. An important step in this direction will be closer co-operation in the co-ordination of advertising. Power companies should tie in their local advertising and make it concurrent with the national programs of electrical manufacturers, Mr. Davidson said, at the same time encouraging other electrical dealers to synchronize their sales and advertising.

Committee Programs

The plans determined upon by the fifteen Commercial Section committees this year constitute a program of commercial activity which should produce most tangible results. While particular attention may be concentrated upon the problems of rewiring and trade relations, these are vital elements in the whole program of well-balanced sales development.

Attention of the wiring committee, of which M. C. Huse is chairman, will be concentrated primarily upon more adequate wiring, with particular reference to increasing the number of outlets. This committee will devote most of its energies to developing ways and means of selling wiring, and it is prepared to join in a national rewiring program which may be undertaken by the entire electrical industry. The work of this and the home-lighting committee will dovetail very closely. Pending further action on a national refixturing plan, C. L. Dunn, chairman of the home-lighting committee, will prepare and distribute a prospectus which in reality will be a sales manual describing successful relighting activities used in different localities.

Plans have been completed by the commercial cooking committee, of which A. M. Lloyd is chairman, to conduct a school for utility salesmen specializing in this branch. The competitive power committee, H. W. Derry chairman, will continue with its investigation of oil engines following its report on this subject, which has just been published. An action of moment taken by this committee was the decision to enter into co-operative relations with associations of manufacturers producing electrically driven apparatus such as fans, hoists, machine tools, etc., in order to sell the electrical aspects of such equipment to prospective users of them.

Continuing his work toward better trade relations started last year, C. E. Greenwood, chairman of the general merchandising committee, will broaden and strengthen his efforts by means of further conferences with retail trade associations. To focus attention upon increasing residential consumption by "one more kilowatt-hour a day" it is proposed to offer a series of prizes totaling $10,000 to the power companies which show the highest percentage increase in energy sales per domestic customer during 1928. Conditions and rules governing competition for the prizes are to be drawn up by a special committee appointed by Chairman Davidson. The general merchandising committee is continuing its study of load-building appliances. It will soon issue a report on ironers and has suggested a study of oil burners.

It was recommended by C. J. Eaton, chairman electrical advertising, that a school be established where power-company salesmen could receive instruction in the principles of outdoor advertising, electric signs and floodlighting used for publicity purposes. The domestic electric range committee (A. B. Collins chairman) is arranging for the distribution of range handbooks. The range committee of the National Electrical Manufacturers' Association is to work jointly with that of the N.E.L.A. A water-heating survey will be conducted in California under the direction of W. C. McWhinney, chairman of the water-heating committee, and an appropriation of $10,000 to carry out this work has been recommended. This survey will be supplemented by similar tests in the Southeast and in some Northern territory to obtain data on this load under different climatic conditions.

Preparation of a sales manual to cover all the phases of electric refrigeration selling and servicing by utility companies has been undertaken by G. B. Richardson, chairman of the refrigeration committee, who also appointed Earl Whitehorne chairman of a sub-committee on trade relations and Ell C. Bennett chairman of the editing committee. More extensive use of the service suggestions issued by the customers' relations committee is planned by C. L. Harold, chairman. Methods of increasing sales of street and highway lighting are to receive particular attention from the committee of which R. J. Malcomson is chairman, and a study is to be made of legislation now in effect and pending in different states which provides for the installation of highway lighting.

The transportation committee (L. M. Branch chairman) reported that there are thirty cities in which conditions are ideal for the use of electric trucks, but in only six of them is there any active promotion of this business. Walter H. Sammis, chairman of the industrial heating committee, has called a meeting for Sept. 19 at Detroit in order that members might at the same time attend the meeting of the American Society of Heat Treating there, a feature of which will be a special exhibit of electric heating equipment.

The General Sessions

Speaking at the general meeting and dinner on Thursday evening, F. D. Pembleton in a masterful address outlined the advantages which the Public Service Electric & Gas Company has found in the operation of its home service department. Mr. Pembleton recommended that every utility establish such a department, but at the same time pointed out that it should be conducted solely from a service and not a sales standpoint, if the fullest benefits are to be realized. George A. Hughes urged upon commercial men the need for thinking and talking in terms of greater kilowatt-hour sales and strongly advocated the adoption of some plan which will result in more adequately wired homes.

At the invitation of A. B. Collins of the Alabama Power Company the Commercial Section voted unanimously to hold its next meeting, which will be in March, in Birmingham.

North Central Association to Keep up Local Meetings

Sectional and group meetings will be continued in the coming months by the North Central Division of the National Electric Light Association, embracing Minnesota and the Dakotas. The sectional meetings, which were highly successful last year, are scheduled as follows:

Devil's Lake, N. D., Wednesday, Sept. 28; local host, Otter Tail Power Company.
Huron, S. D., Wednesday, Oct. 19; local host, Northwestern Public Service Company.
Duluth, Minn., Wednesday, Nov. 30; local host, Minnesota Power & Light Company.
St. Cloud, Minn., Wednesday, Feb. 15; local host, St. Cloud division, Northern States Power Company.
Sioux Falls, S. D., Wednesday, March 21; local host, Sioux Falls division Northern States Power Company.
Albert Lea, Minn., Wednesday, April 25; local host, Interstate Power Company.

The Accounting Section will meet on Oct. 7 and 8, the Commercial Section on Nov. 11 and 12 and the Engineering Section on Jan. 20 and 21, all at the Nicollet Hotel, Minneapolis.

Pennsylvania Men Listen to Industry Leaders

N.E.L.A. Officers, Heads of Utilities, Committee Workers, Manufacturers, Government, Rural and Commercial Specialists Talk at Bedford Springs

GETTING down to work on Thursday, Sept. 8, with a registration of more than 700, the Pennsylvania Electric Association (which together with the Empire State Gas and Electric Association and the newly organized New Jersey Electric Association forms the Eastern Division of the National Electric Light Association) held its annual convention last week at Bedford Springs, Pa. It was one of the best attended and most successful conventions of the many held by this organization at Bedford Springs. P. H. Chase, the retiring president, announced that in the last two years the Pennsylvania power companies have taken on 363,000 more customers, decreased the price of electricity per kilowatt-hour 12 per cent owing to increased efficiency in operation and effected a gain in fuel economy of 39 per cent. In the past eight months of the year 547 units of rural electrification have been completed, reaching 1,925 farms and taking on 12,800 customers in all.

H. T. Sands, president of the National Electric Light Association, speaking before the public policy committee session, discussed the fundamental need for public information. The industry started out, he said, with the belief that good service, equitable rates and fair dealing were all that were needed in the operation of a public utility. It finds now that there is a great lack of fundamental facts in the public mind about the industry and an abundance of misinformation. The industry cannot blame the public, Mr. Sands said, for misunderstanding its ideals and purposes at times if it fails to give the people the facts on which to base their judgment. It is for this reason, he went on, that on such issues as that of Boulder Dam, for example, where it is proposed to recoup the cost of flood control by revenues derived from the generation and sale of hydro-electric power, the public fails to realize the possible consequence from such a precedent of government intrusion into private business. Such a policy would clearly controvert the basic principles of individualism around which America is organized.

P. S. Clapp, managing director N.E.L.A., outlined in detail the considerations which are involved in various large water-power projects now under discussion in Congress and over the country, embracing features of navigation, irrigation, flood control, water supply and hydro-electric development.

The cost of accident prevention to employees was the subject of an address by G. M. Gadsby, president West Penn Power Company, who proved by the experience of Pennsylvania companies that this cost is more than justified by its benefits to the worker and to the employer. Major H. S. Bennion of N.E.L.A. headquarters talked on federal regulation before the engineering session, and S. S. Wales of the Carnegie Steel Company discussed the public utility from the large users' standpoint. E. W. Ely of the Department of Commerce presented an illustrated lecture on the experience of other industries in the development of simplified practice, pointing out possibilities for its application to the electrical industry.

In an inspiring address on public relations, J. F. Owens, chairman of the Public Relations National Section, stressed the point that public relations are, after all, just the application of the golden rule to industry, thus placing an obligation on every employee, though responsibility is directly chargeable to the executive himself. E. M. Hodges also addressed the public relations session, as did W. S. Vivian, who has been directing the public speaking work for the N.E.L.A.

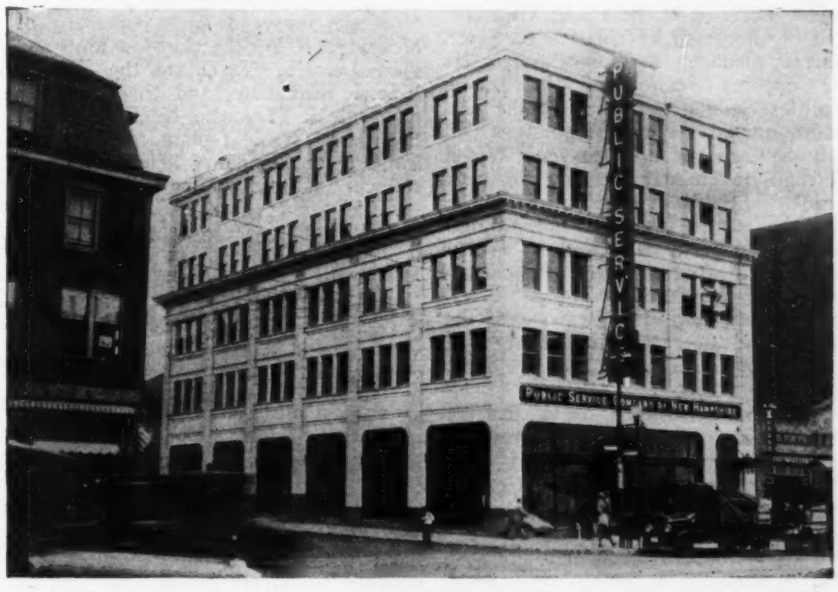
Earl Whitehorne, commercial editor of the ELECTRICAL WORLD, before the women's committee session, described the need in modern homes for a complete plant of mechanical equipment to meet the economic stresses of present housekeeping, pointing out that the entire approach to the problem had been directed by men chiefly intent on their plans for the manufacture and sale of merchandise. No organized, intelligent effort has been made to work out a balanced program for meeting the women's problem and to install, not single appliances, but the complete plant, financed under mortgage as in the installation of complete bathrooms. Speaking later before the Commercial Session, Mr. Whitehorne delivered the "message from the sales managers" which he presented at the Atlantic City convention and has been carrying to the geographic section meetings, urging an immediate crusade to sell one more kilowatt-hour per day to the American home.

Thomas W. Berger, president Deft Devices Company, in arguing the need for more energetic merchandising by the power companies, cited the fact that in Philadelphia last year 26,000 flatirons were sold, but in the same period 46,000 more residence customers were connected. The net result was a reduced saturation in flatirons and a falling behind in the progress of building up public acceptance. J. M. McKee of the Pennsylvania joint committee on rural electrification discussed the need for power on the farm and the method which must be employed to sell it.

The Walter H. Johnson prize of $250 in gold was awarded to Clara H. Zillessen for her paper entitled "Developing the Residence Load by Other than the Usual Methods." A first-aid contest competed in by teams from five companies was won by the Penn Central Light & Power Company.

The following officers were elected to

New Hampshire Company's Manchester Headquarters



ONE of the best equipped utility office and display buildings to be found in the New England States has just been thrown open to visitors by the Public Service Company of New Hampshire. It occupies an advantageous site at the corner of Elm and Lowell Streets, Manchester, N. H., and is in the heart of the business section. The building is a substantial and ornate structure of five stories, fireproof, and is of iron, brick, Italian marble and cement construction, the outside being in imitation of white granite. On one of the interior walls is a map of New Hampshire, the various plants of the company and points of distribution being indicated by red electric lights. Three days were devoted to receiving the public and acquainting visitors with the size of the business carried on by the company and demonstrating to what extent electricity can be made use of in the home, factory, mill and office. The display of electrical goods was probably the largest ever made in the state.

serve for the coming year: President, J. S. Wise, Jr., Pennsylvania Power & Light Company, Allentown; vice-presidents, F. R. Phillips, Duquesne Light Company, Pittsburgh, and W. E. Long, Philadelphia Electric Company; treasurer, I. L. Craig, Philadelphia Electric Company; secretary, H. A. Bisch, Harrisburg.

Well-Known Men to Address Commissioners

A notable list of speakers is announced for the thirty-ninth annual convention of the National Association of Railroad and Utilities Commissions, to be held in Dallas, Tex., Oct. 18-21. Governor Dan Moody of Texas, Senator Key Pittman of Nevada, Senator Earl B. Mayfield of Texas, John J. Esch, chairman of the Interstate Commerce Commission; William A. Prendergast, chairman of the New York State Public Service Commission; General W. W. Atterbury, president of the Pennsylvania Railroad, and Walter S. Gifford, president of the American Telephone & Telegraph Company, will be among them.

Leading features of the program will be reports and addresses on water power, public utility rates, holding companies and topics connected with railroads and bus companies.

Public Utilities Section's Part in Safety Congress

"Qualifications and Duties of a Safety Director in the Public Utilities" will be discussed by Charles B. Scott, general manager Bureau of Safety, at the opening session of the Public Utilities Section gathering at the sixteenth annual Safety Congress, which will be held at the Stevens Hotel, Chicago, on Tuesday morning, Sept. 27. Frank W. Smith, vice-president of the United Electric Light & Power Company, New York, will dwell on "Ways and Means of Impressing Executives and Operating and Designing Engineers," and W. H. Brown of the Northern States Power Company will speak on "Unloading Poles from Railroad Cars Safely."

At the second session, on Wednesday morning, first-aid instruction in resuscitation will be demonstrated, and "Fire Prevention for Public Utility Companies" will be discussed by E. J. Smith of the Underwriters' Laboratories.

On Thursday morning J. C. Sanderson, of Sargent & Lundy, will speak on "Construction Contractors' Accidents on Public Utility Properties," and Walter Wagner, of the Philadelphia Electric Company, will talk about "Elimination of High-Voltage Hazards on Customers' Premises." "Organizing for Accident Prevention in Public Utilities" will be the topic of H. F. Webb of the West Penn System, and William A. Durgin of the Commonwealth Edison Company will talk about "Making Light of the Mystery."

Purchases and Mergers

Kentucky, Virginia, Minnesota, Oklahoma and Colorado Companies Among Those Buying Small Properties in Their Territory

H. D. FITCH, president of the Kentucky-Tennessee Light & Power Company (Associated System), reports the purchase not only of the municipal light and power plant at Gallatin, Tenn., as already noted, but also of the municipal light and power plant at Russellville, Ky. These are the thirtieth and thirty-first municipal properties acquired by that company during the past two years. In addition it has acquired ten privately owned electric properties and two ice properties. The company is now serving more than 75 properties in Kentucky, Tennessee and Indiana.

The Virginia Public Service Company has purchased the electric power plant at Clarksville, effective Sept. 1. This company recently acquired the plant at South Hill. With the acquisition of the Clarksville plant it controls a system covering almost all of Southside Virginia.

The Public Service Corporation of North Dakota has purchased the local plants in that state owned by the Drake-Jones Company, which has in recent months been active in acquiring small properties. Other recent sales in the Central Northwest are: New Richland (Minn.) Light & Power Company to the Northern States Power Company; Hazelton (N. D.) plant of the Lytle Light & Power Company and Frederick (S. D.) municipal lighting plant to the Northern Power & Light Company of Mobridge, S. D.; the plants at Mott and New Leipzig, N. D., to the Hughes Electric Company, and the municipal plant at St. Thomas, N. D., and the Edinburg (N. D.) plant to the Otter Tail Power Company. The last-named company is to turn back the Grafton (N. D.) power plant to the City Council following a legal controversy over its sale, and the village of Littlefork, Minn., has purchased the plant of the Littlefork Light & Power Company.

The citizens of Fort Cobb, Okla., have voted, 89 to 9, to sell their municipal electric distribution system and high-tension line to the Southwestern Light & Power Company. Fort Cobb has been purchasing electricity wholesale from this company at Carnegie.

The Public Service Company of Colorado has purchased the Clear Creek Power & Development Company and has asked the state commission for permission to supply energy to Empire and Dumont, in Clear Creek County, Col.

Idaho-Utah 132-Kv. Line Goes Into Service

The Idaho Power Company announces that the 132-kv. line constructed this year between its hydro-electric plant at American Falls and Shoshone, whence a similar line built by the Utah Power & Light Company extends to Wheelon, Utah, has successfully stood a week's test. Its completion gives the Idaho Power Company direct connection between all its plants, insuring the company against interruption of service at any point. The line is more than 90 miles in length, required nearly eight months to build and represents an investment of approximately $500,000, an equal amount having been spent by the Utah company.

An addition to the American Falls plant, including the installation of two 6,000-kw. generators, which nearly doubled its capacity, necessitated the outlay of upward of $900,000. Other expenditures in Idaho have raised the total to nearly $2,500,000.

Electrochemists Convene as They Journey

About fifty members of the American Electrochemical Society left Chicago Sept. 4 on the society's tour to Seattle, Wash., and Vancouver, B. C., and back, with technical sessions *en route*. The first stop was at Minneapolis, where a meeting was held at the University of Minnesota. Here four papers were presented.

The first paper, by I. J. Moltkehansen, was on the electrochemical and electrometallurgical industries in Norway. Despite unwise expenditures due to insufficient investigation, he said, Norway exported in 1926 more than 50 products aggregating 360,000 tons and valued at about $50,000,000. Of 2,000,000 hydro-electric horsepower generated in Norway, 800,000 hp. is used in these industries. Eric A. Lof discussed the paper.

S. E. Sheppard gave a good paper on the electrodeposition of rubber. This process, he said, uses natural or prepared rubber latex wherein the negatively charged rubber particles are subjected to an electric field to form anode deposits. The process can use reclaimed rubber masticated in glue and water as well as the virgin latex. It produces either "hard" rubber or the elastic form as desired.

A third paper, by J. Slepian, dealt with thin film rectifiers based on the emission of charged particles from metal under the influence of an electric field. If normal insulating material of high dielectric strength is placed near the metal, Mr. Slepian said, it is possible at normal temperatures to get unidirectional conduction.

The final paper was by S. C. Lind and George Glockler. In former researches the investigators had used radon emanations to cause condensation from ethane and other gases. In this paper attempts to secure the same results by use of silent electric discharges were described.

Anaconda, Butte and Great Falls, Mont., and other places were visited by the electrochemists on their way to Seattle and Vancouver, a second technical session being held in the Canadian city and a third being scheduled for Keokuk, Iowa, on the return journey, which will end Sept. 21.

Briefer News

ELYRIA, OHIO, HAS COMPLETE BELT-LINE SYSTEM.—The Elyria division of the Ohio Public Service Company is now building 3.8 miles of 23,000-volt transmission line, which will complete a belt line of that voltage surrounding the city. In connection with it a switching structure will be erected near the plant of the Elyria Iron & Steel Company.

NASHVILLE HONORS MEMORY OF PERCY WARNER.—The Nashville Board of Public Works and Park Commission has honored the memory of Percy Warner, who played a prominent part in utility company service and hydro-electric development in Tennessee and also did much for civic progress, by naming a park of about 1,400 acres on the outskirts of Nashville Warner Park in his memory.

CENTRAL INDIANA POWER MERGER WITH TERRE HAUTE COMPANIES DELAYED.—The adjustment under way preliminary to the consolidation of the Central Indiana Power Company with properties of the Terre Haute, Indianapolis & Eastern Traction Company as the Indiana Electric Corporation still lacks completion, and it seems probable, Indianapolis advices say, that those in charge of the merger will not make formal application to the Indiana Public Service Commission before December or January.

WISCONSIN POWER & LIGHT BUILDING SMALL PLANT ON WOLF RIVER.—The Wisconsin Power & Light Company has started construction of a power dam on the Wolf River, 3 miles north of Shawano on a site purchased from the city. The dam, which should not be confused with the project on the Indian reservation concerning which there has been controversy, will carry a 14-ft. head, and the turbine to be installed will develop 900 hp.

WEST TEXAS UTILITIES COMPLETES UNIT AT SAN ANGELO.—Another important addition to its power facilities has just been made by the West Texas Utilities Company by the completion of the first 8,000-hp. unit in its new San Angelo power plant. The plant is situated on the Concho River, and its ultimate capacity will be 30,000 hp. Construction will probably not be long delayed on the additional units, as power for the oil fields and communities in the Pecos River area is being supplied largely from this plant.

SPRINGFIELD (MASS.) COMPANY'S PLANS FOR INDIAN ORCHARD. — Contracts will be let soon for the installation of two waterwheels of 3,000 hp. and 2,000 hp. and generators to correspond, and also for the construction of a penstock about 300 ft. long and 15 ft. in diameter, for the United Electric Light Company, Springfield, Mass., to increase the capacity of its No. 2 plant at Indian Orchard, utilizing water power hitherto used by the Indian Orchard Company. The estimated cost of these improvements is $225,000, and the work is to be completed by March 1. The Indian Orchard Company will electrify its textile mill and purchase energy from the United Electric.

PLANS FILED FOR OUAREAU RIVER DEVELOPMENT. — The Gatineau Power Company, subsidiary of the Canadian International Paper Company, announces that it intends developing Magnan Falls on the Ouareau River, in the Province of Quebec. Plans for the construction of dams, power houses and other work have been deposited with the provincial government.

SITE BOUGHT FOR NEW POWER HOUSE AT TAMPA, FLA.—Purchase of 22 acres for a power-house site for the Tampa Electric Company on Hooker's Point, near Tampa, for a cash consideration of approximately $20,000 per acre, is announced by Peter O. Knight, president of the company. No definite details regarding the size or cost of the projected station have been made public.

A REVIEW OF "GIANT POWER."—A pamphlet bearing the title "Giant Power Proposals in Pennsylvania: A Review" has been issued by the Pennsylvania State Chamber of Commerce, Harrisburg. The conclusion is that what "giant power" proposed is being essentiall done under private ownership and that "Giant power, which threatened a menace to Pennsylvania, has been completely repudiated."

SIOUX CITY GAS & ELECTRIC INSTALLING FOURTH BOILER. — Installation of a fourth boiler in the Sioux City (Iowa) Gas & Electric Company's Big Sioux power house has been started. Three boilers were installed when the plant was constructed two years ago and room was left for the fourth. The new boiler will be used as a spare unit. It has a normal rating of 1,112 hp. but is capable of developing four times that much. Operation will be at 350 lb. pressure, 150 deg. superheat and a temperature of between 700 deg. and 725 deg. Installation will require about 30 days.

DIRT BEGINS TO FLY ON SALUDA RIVER PROJECT. — Actual construction work on the big Saluda River plant of the Lexington Water Power Company in South Carolina started on Monday of this week, according to J. J. Hock, president of the Arundel Corporation of Baltimore, which has a seven-million-dollar contract to erect the dam. The branch railroad to the site will be completed in about 35 days and the diversion tunnel within six months. It is expected that the whole undertaking will be finished by the end of 1930. H. O. Firor of Baltimore, general superintendent of the Arundel Corporation, is to be in charge of operations. About 150 men will be employed at first, and this number will be gradually increased as operations multiply until at the peak period in the operations they will number 1,000 to 1,200.

SITE ACQUIRED FOR LEASIDE PLANT OF ONTARIO HYDRO.—The Hydro-Electric Power Commission of Ontario has acquired a site for the station to be built at Leaside, on the outskirts of Toronto, to receive the energy to be transmitted over the Ottawa-Toronto high-tension lines. The entire development will involve an expenditure of approximately $5,000,000. The land was purchased at a cost of $150,000.

TRIPLE INTERCONNECTION IN KANSAS. —Lawrence, Kan., served by the Kansas Electric Power Company, will soon be connected with the lines of the Kansas Power & Light Company of Topeka. A 66-kv. single-circuit transmission line is being built from Lawrence to the Tecumseh plant of the Topeka company, a distance of approximately 25 miles. With the completion of the line three of the major power companies of the state will be interconnected.

PUBLIC SERVICE OF NEW JERSEY TO CONDEMN RIGHT-OF-WAY FOR NEW TRANSMISSION LINES. — Under the terms of a statute passed in 1925, the New Jersey Board of Public Utility Commissioners has granted to the Public Service Electric & Gas Company the right to condemn property for high-tension lines in Passaic, Essex, Middlesex, Union and Somerset Counties. The company is understood to desire to build lines from its Kearny, Essex and Marion stations in the Newark-Jersey City district to Paterson, Metuchen, Cranford, Perth Amboy and other cities served by it.

NEW INTERCONNECTING LOOP IN KANSAS WILL BENEFIT SIXTEEN TOWNS. — Sixteen Kansas towns will benefit from a new power loop resulting from an interchange agreement between the United Power & Light Company of Hutchinson and the Great Bend Water & Electric Company. The loop involves construction of approximately 25 miles of 33,000-volt line from Hoisington to Claflin and the reconstruction of a similar line from Ellsworth to Frederick. The Hutchinson company is spending about $500,000 in additional plant equipment. Three new substations are included in the project.

TEN SUBSIDIARY TRANSMISSION COMPANIES CHARTERED IN PENNSYLVANIA. —Right-of-way charters for the Pennsylvania Power & Light Corporation have been granted by the State Department at Harrisburg, giving the power corporation the right to connect its properties in Schuylkill, Montgomery, Lebanon and Dauphin Counties. Companies chartered in Lebanon, Schuylkill and Dauphin Counties to construct transmission lines to connect the Pine Grove plant with the Harrisburg plant are the Pine Grove Township-Schuyl-

kill, Union-Lebanon, Bethlehem-Lebanon, East Hanover-Lebanon, South Hanover-Dauphin, Swatara-Lebanon and East Hanover-Dauphin Power & Light companies. Those for connecting lines in Montgomery County are the Lower Salford-Montgomery, Marlborough-Montgomery and Salford-Montgomery Power and Light companies.

FOUR-CUSTOMER COMPANY DEFENDS ITS TERRITORY.—While admitting that its present customers number only four, the Wood River Electric Company of Fort Klamath, Ore., has entered a formal protest against the proposal of the California-Oregon Power Company to construct a transmission line through Fort Klamath to serve power and light customers in the Crater Lake region. The Wood River Company asks the Public Service Commission to deny the extension on the ground that it will constitute an unlawful invasion of territory.

FIFTEEN NEW HYDRO PLANTS PLANNED IN QUEBEC.—The official *Gazette* of the Province of Quebec contains a notice to the effect that Henry Atkinson, Limited, is planning the construction of fifteen new water-power plants in the province. Plans for all of them have been submitted to the Department of Lands and Forests. Three will be on the Etchemin River, in Dorchester County. Others are on the streams bordering the districts of Levis, St. Anselme, St. David de l'Auberivière, St. Henri de Lauzon, St. Jean Chrysostome, St. Louis de Pintentre, St. Romauld d'Etchemin and St. Télesphore.

SECTIONAL CONFERENCE OF OKLAHOMA UTILITY MEN HEARS SEVEN PAPERS.—When the Western District conference of the Electric Light and Power Division of the Oklahoma Utilities Association met at Clinton on Sept. 13 for a one-day session, under the chairmanship of F. D. Shaffer, papers from C. D. Martin, H. N. Faris, Snowden Hunt, L. S. Reagan, Judge E. L. Mitchell, J. T. Naylon and S. I. McElhoes were read, covering respectively local plants, inductive co-ordination, "side responsibilities," "white-way" installations, the customer's viewpoint, relation of the general office to the local manager, and rural development. E. F. McKay, manager of the Oklahoma Utilities Association, spoke at the luncheon on "Fixing Our Fences."

ELECTRICITY FOUND CHEAPER THAN GAS.—Claiming that potential gas consumers in the village of Medina, N. Y., and vicinity could be served for cooking and water heating by electrical energy at a less cost and greater efficiency to them, and that it could not supply gas at a reasonable price, the Western New York Utilities Company has withdrawn an application to serve that territory with gas. The withdrawal application said: "Gas is no longer practical for lighting purposes, and we are convinced that it cannot compete in your town with either coal or coke for heating purposes. As gas would be used primarily for cooking and heating water, the local users would obtain the same service by electric current at a much less cost to them."

"ACTIVE-ROOM" RATES IN INDIANA.—Opposition to experimentation by the Northern Indiana Power Company with the "active-room" schedule of electric light charges at Huntington, Ind., was supplemented recently by a petition filed with the Indiana Public Service Commission requesting a full investigation of rates and power production costs, with a view to giving Huntington a flat reduction comparable with a 5-cent rate at Fort Wayne. The optional schedule the company has offered, according to this group of objecting consumers, has been submitted as a substitute for a flat reduction and in prospect of defeating steps by the Huntington city administration to establish a municipal light plant. Mayor C. W. Snider threatens that the city will enter the commercial field and sell electricity at a lower rate than that now charged by the power company. Another hearing on the trial schedule has been set by the commission for Dec. 6, when results of the experiment will be noted. It is thought that success at Huntington will lead the Insull companies to extend the experiment to other localities in Indiana that they serve.

WEST PENN SYSTEM DEDICATES LAKE LYNN TO THE PUBLIC.—The West Penn Electric System dedicated a newly formed lake in West Virginia to the service of the public on Wednesday, Sept. 14. This lake, situated on the Cheat River, about 80 miles south of Pittsburgh, was formed by the dam built by the company across the Cheat River at Cheat Haven, where it has a hydro-electric plant. Gov. Howard M. Gore of West Virginia participated in the dedication ceremonies with H. Hobart Porter, president American Water Works & Electric Company, the parent concern, and Walter S. Finlay, Jr., president West Penn Electric Company. The lake is named in honor of the late Albert M. Lynn, former West Penn president.

ANOTHER MILLION FOR ST. LOUIS LIGHTING.—Final surveys are nearing completion and contracts will be let probably in November for the construction of a down-town "white way" in St. Louis, to cost upward of $400,000. The section to be illuminated includes the principal thoroughfares between Twelfth Boulevard and Fourth Street between Franklin Avenue and Morgan Street. The city lighting division plans to install 400 standards with two 1,250-cp. lamps each and 1,050 with single 1,500-cp. globes. Each will be 19 ft. 6 in. high. In addition the city plans to install 2,500 concrete lighting standards equipped with single 150-cp. to 250-cp. globes in the section between Jefferson Avenue and the Mississippi River, Cass Avenue and the Terminal railroad tracks outside the downtown district. This work, it is estimated, will cost aobut $600,000.

CENTRAL MAINE TO BUILD 35½-MILE, 110-KV. TRANSMISSION TRUNK LINE.—Immediate construction of a 110-kv. transmission line 35½ miles long from its new Gulf Island plant near Lewiston via Farmingdale to the Maxcy substation has been authorized by the Central Maine Power Company at a cost of about $500,000, and it is expected that the line will be completed before winter. Initial equipment will be for 66-kv. operation, with provision for the ultimate use of the higher voltage. At Farmingdale there will be a crossing over the Kennebec River. The line, which will increase the capacity of the company's transmission system into the Rockland district, where an important new cement plant has been located, will embody the largest transmission construction job ever undertaken by the company. The engineering work is being done by the New England Public Service Company, Augusta, Me., of which F. H. Mason is chief engineer.

Coming Meetings

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see the ELECTRICAL WORLD for July 2, page 50.]

American Welding Society — Book-Cadillac Hotel, Detroit, Sept. 19-23. M. M. Kelly, 29 West 39th Street, New York.

New England Central Station Association of Power Engineers—Chamber of Commerce, Boston, Sept. 21. T. D. Bond, 200 Devonshire St., Boston.

Great Lakes Division, N.E.L.A. — French Lick Springs, Ind., Sept. 22-24. R. V. Prather, 205 Illinois Mine Workers' Bldg., Springfield, Ill.

Association of Edison Illuminating Companies—Colorado Springs, Col., Sept. 26-30. P. S. Millar, 80th St. and East End Ave., New York.

International Association of Electrical Inspectors, Western Section—Toronto, Canada, Sept. 27-29. W. S. Boyd, 175 W. Jackson Blvd., Chicago.

American Electric Railway Association—Cleveland, Oct. 3-7. J. W. Welsh, 292 Madison Ave., New York.

Empire State Gas and Electric Association—Lake Placid Club, Lake Placid, N. Y., Oct. 6 and 7. C. H. B. Chapin, Grand Central Terminal, New York.

Illuminating Engineering Society — Edgewater Beach Hotel, Chicago, Oct. 11-14. L. H. Graves, 29 West 39th St., New York City.

Eastern Association of Electrical Inspectors — Springfield, Mass., Oct. 12-13. E. P. Slack, 85 John St., New York.

Southern Appalachian Power Conference—Chattanooga, Tenn., Oct. 13-15.

Rocky Mountain Division, N.E.L.A.—Broadmoor Hotel, Colorado Springs, Col., Oct. 17-20. O. A. Weller, 900 15th St., Denver.

National Association of Railroad and Utilities Commissioners — Dallas, Tex., Oct. 18-21. James B. Walker, 270 Madison Ave., New York.

Kansas Section, N.E.L.A. — Larner Hotel, Salina, Kan., Oct. 20-21. H. L. Jones, 401 National Reserve Bldg., Topeka.

Public Utilities Association of West Virginia—Parkersburg, W. Va., Oct. 26-27. A. B. McCrum, 514 Charleston National Bank Bldg., Charleston.

Commission Rulings

ARBITRARY CHARGES MADE BY HOLDING COMPANIES AGAINST SUBSIDIARIES DISALLOWED.—The Wisconsin Railroad Commission has ruled that arbitrary charges made against subsidiary companies by holding companies for services which may or may not be required will not receive the approval of the commission and that this practice shall be discontinued by companies involved in the cases investigated by the commission. Services that can be proved will be allowed.

COMMISSION SEEKS TO STOP "GRABBING" OF TERRITORY FOR FUTURE EXPLOITATION.—Provisions to prevent electric power companies obtaining territory without rendering service have been placed by the Maryland Public Service Commission in orders approving extension of lines. Orders granting the Consolidated Gas, Electric Light & Power Company and the Conowingo Electric Light & Power Company the right to extend lines in Harford County were qualified with the provision that the extensions must be completed within a specified number of months after the issuance of the orders. This provision is an innovation in Maryland and is designed to prevent the "grabbing" of territory for future exploitation.

COMMISSION MUST FOLLOW COURT IN APPROVING OCCUPATION OF RIGHT-OF-WAY.—A transmission line of the West Penn Power Company crossing the tracks and right-of-way of the Westside Electric Street Railway Company 185 ft. above ground has been approved by the Pennsylvania Public Service Commission over the protest of the company last named. The commission asserted its jurisdiction and said that, the question of the right of the West Penn company to acquire by eminent domain the right-of-way for this line, which connects its Charleroi and Cheat Haven substations across the property and facilities of the street railway company, having been affirmatively determined by a court of competent jurisdiction, it became incumbent upon the commission to follow this determination until and unless it should be reversed by an appellate court.

FUEL CLAUSE MUST AGREE WITH BASIS ON WHICH IT IS ESTIMATED.—The Missouri Public Service Commission has disapproved a fuel clause in a contract for electric service made by the Tarkio (Mo.) utility for service at Rock Port, on the ground that the clause did not agree with its basis. The commission said: "The fuel consumed per kilowatt-hour generated for the year 1926 was 6.37 lb. Checking that consumption and the cost of it against the fuel clause in the Rock Port contract, we fail to see the reasonableness of the clause. The contract, as stated above, provides a charge of 1 mill for each 10 cents increase per ton in cost of the coal used above $2.86 per ton. This means that if the cost of 20 lb. of coal is increased 1 cent, the wholesale cost of electricity at Rock Port will be increased 1 cent per kilowatt-hour. However, the defendants show it takes only 6.37 lb. of coal to make a kilowatt-hour, which, with 15 per cent transmission-line loss, is equivalent to 7.48 lb. of coal per kilowatt-hour delivered at Rock Port. The result is that for a dollar increase in cost per ton of coal the defendants for energy delivered at Rock Port charge 1 cent per kilowatt-hour, whereas the actual increase in cost of energy due to increased cost of fuel is 0.374 cent per kilowatt-hour."

PRUDENT INVESTMENT AS A BASIS FOR VALUATION.—In its order reducing substantially the rates of the Worcester Electric Light Company, already reported at length in the ELECTRICAL WORLD (June 11, page 1294), the Massachusetts Department of Public Utilities put its defense of its valuation policy, with prudent investment as the rate base, in the following words: "The whole tenor and effect of our public utility capitalization statutes from the beginning has been to have the outstanding capital indebtedness at all times approximate the value of the property. There is not the slightest intimation in any of such statutes or decisions by the commission or its predecessors, or the prescribed methods of accounting, that these companies be allowed to issue new capital or charge rates to yield a return on property put into plant either from excess earnings or unearned increment. In the Middlesex & Boston (1914) case the depreciated value of the petitioner's property did not equal its outstanding capital and debt and the commission laid down the following rule: 'Accordingly, we rule that under Massachusetts law capital honestly and prudently invested must, under normal conditions, be taken as the controlling factor in fixing the basis for computing fair and reasonable rates; . . . that production cost either with or without depreciation, while it may be considered, is not, under our law, to be taken as the determining basis for reckoning rates.' By the application of this rule no one is unfairly treated. It is just alike to the stockholders and the ratepayers—to the stockholders in that the company is entitled to charge such rates as will yield a fair return upon their investment, and to the ratepayers in that they will be required to pay no more than a fair return on that investment. It is inconceivable that it was ever the intention of the Legislature or the municipalities, when they granted these companies the right without charge to use the public streets and the exclusive right to sell gas or electricity to citizens, that in return for these valuable privileges they should ever attempt to exact anything but a fair return on the money they paid into the enterprise. There is a vast difference between a company operating under such conditions and the ordinary private company not possessing such privileges, which fact seems to be entirely lost sight of. The securities of these companies were never intended to be speculative, or that the dividends paid upon their stock would be such as to permit dividends to be paid on twice as many shares of stock as were represented by the par value of the stock and premium of the utility, and sell in the open market at or above par."

Recent Court Decisions

SAC CITY'S RIGHT TO EJECT COMPANY FROM ITS STREETS UPHELD.—The Supreme Court of Iowa has found, in Sac City vs. Iowa Light, Heat & Power Company, that where a franchise was given by a city to a power company subject to termination on notice and providing that in the event of termination the city should purchase all extensions and improvements, the city's purchase of such property was not a condition precedent to its right to terminate the franchise, and it could exercise this right at will without giving a reason. When the city legally terminated the franchise, the power company's occupation of streets and public places with its poles and wires constituted a trespass, entitling the city to compel their removal by action in equity. Where amount due from the city to the company to compensate the latter for its property had not been determined, an order for writ of removal should be withheld until such determination. (214 N. W. 571.)*

CHARGE TO JURY THAT COMPANY SHOULD BE FULLY AWARE OF CONDITION OF WIRES AT ALL TIMES HELD HARMFUL ERROR.—An instruction to the jury by the trial judge in Jackiewicz vs. United Illuminating Company—a case where a three-year-old child was injured by grasping an electric wire alleged to have been broken through rubbing against the branch of a tree—was held by the Supreme Court of Errors of Connecticut to be so harmful as, coupled with another judicial error in seeming to assume as fact a controverted assertion, to warrant the reversal of a verdict for the plaintiff and the ordering of a new trial. The erroneous instruction was to the effect that it was the defendant electric light company's duty to inspect its wires as often as required reasonably to enable it to be fully aware of their condition at all times. "This," said the superior court, "would impose practically an impossible burden, for no large utility furnishing light and power could possibly inspect its wires to that extent. (138 At. 147.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

News About Men of the Industry

S. Z. Mitchell Chairman of American and Foreign Board

At a meeting of the board of directors of the American & Foreign Power Company, Inc., held Sept. 6, S. Z. Mitchell, formerly president of the company, was elected chairman of the board. C. E. Groesbeck and F. B. Odlum, formerly vice-presidents of the company, were elected vice-chairmen, and Curtis E. Calder, formerly president of the Texas Power & Light Company, was elected president of the company.

WILLIAM BLANCHARD, Jr., has been appointed district manager in charge of the Chicago office of McClellan & Junkersfeld, engineers and constructors.

D. L. CURRIER has been appointed superintendent of the Home Electric Company at Coudersport, Pa., to succeed A. B. Eadie, who has assumed new duties at St. Marys, Pa.

GUS F. TAYLOR, president of the Citizens' National Bank, Tyler, Tex., has been elected a member of the board of directors of the Texas Power & Light Company.

DR. ROBERT A. MILLIKAN, executive head of the California Institute of Technology, has been awarded the honorary degree of doctor of science by the University of Leeds (England) for his work in cosmic and electronic physics.

GEORGE W. IREY, formerly production superintendent of the Ohio Public Service Company, Cleveland, has been appointed to a similar position with the Empire District Electric Company at Joplin, Mo.

C. B. CROCKETT, recently co-ordination engineer in the Pittsburgh district for the Byllesby Engineering & Management Corporation, has resigned that position to join the staff of the Society for Electrical Development, where he will take charge of the program on industrial electric truck transportation. Mr. Crockett succeeds H. J. PAYNE, who has joined the staff of the American Leather Producers, New York.

A. F. KELLER, commercial manager of the Public Service Company of Oklahoma, has resigned to affiliate himself with the Indiana Public Service Company.

C. G. DURFEE has resigned as a member of the staff of the Society for Electrical Development to become sales engineer for the Pyrene Manufacturing Company of Newark, N. J. Prior to his work in the field department of the society, Mr. Durfee was connected with the headquarters sales department of the Westinghouse Electric & Manufacturing Company for a number of years. Mr. Durfee's first position following graduation from Yale was that of combustion engineer for the New York Edison Company.

H. H. Ganser Manager of Philadelphia Utility

H. H. Ganser, resident manager of the Counties Gas & Electric Company at Norristown, Pa., since 1912, has been elected general manager of the Philadelphia Suburban Counties Gas & Electric Company, recently formed from the merger of the Counties Gas & Electric Company and the Philadelphia Suburban Gas & Electric Company. For more than 28 years Mr. Ganser has been affiliated with the public utility field, relinquishing newspaper work in 1899 to enter the employ of the Gas Company of Montgomery County. In 1901 he became superintendent of that company and in 1902 manager of the Norristown Steam Heat Company. Two years later he assumed the duties of agent of the Norristown Electric Light & Power Company, and in 1912 when that utility together with the Gas Company of Montgomery County merged with thirteen other companies into the Counties Gas & Electric Company he became manager, the position he has held until his recent election.

H. H. GANSER

Mr. Ganser has been a prominent figure in association work in Pennsylvania, being a past-president both of the Pennsylvania Electric Association and of the Pennsylvania Gas Association. In addition he is a member of the American Institute of Electrical Engineers, the Illuminating Engineering Society and the Engineers' Club of Philadelphia.

J. H. KINZER, formerly connected with the engineering department of the Alabama Power Company at Montgomery, has been appointed district manager at Greenville to success Dean H. Davis.

R. J. RUSSELL, a vice-president and director of the Century Electric Company, St. Louis, has been elected a member of the board of the National Electrical Manufacturers' Association to succeed F. S. Hunting of the Robbins & Myers Company, who has resigned.

ALBERT R. ASKUE, who has been connected with the Cleveland Electric Illuminating Company for the past nineteen years, has resigned to become construction superintendent with the A. J. Penote Company, a contracting organization specializing in underground conduit construction.

E. T. ANDERSON, who recently resigned his position as electrical engineer for the Board of Water and Electric Light Commissioners, Lansing, Mich., has become sales engineer with the Flack, Pennell Company, Saginaw, Mich. Mr. Anderson will take charge of the electrical department.

R. L. WILSON, works manager of the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Company, has been appointed assistant to the vice-president and general manager. Mr. Wilson has been affiliated with the Westinghouse company since 1893, when he joined its ranks following graduation from the Rose Polytechnic Institute.

J. M. HIPPLE, manager of the motor engineering department of the Westinghouse Electric & Manufacturing Company, has been appointed works manager at East Pittsburgh to succeed R. L. Wilson, who has assumed new duties. Mr. Hipple joined the Westinghouse company in 1898, the year in which he was graduated from Ohio State University. Mr. Hipple has devoted his time especially to design work.

R. C. STALLINGS, for fourteen years identified with the electrical industry of Kansas and since 1924 manager of the Kansas Electric Power Company's interests at Council Grove, has resigned this connection to engage in business for himself at Parsons, Kan. He will establish a firm for general electrical contracting and the sale of electrical merchandise. While associated with the Kansas Electric Power Company he also held positions at Leavenworth and Parsons.

W. P. HAMMOND, formerly assistant to the chief engineer of the Georgia Power Company, has been named assistant to O. G. Thurlow, chief engineer of the Southeastern Engineering Company, with headquarters in Birmingham. Following graduation from the Georgia School of Technology in 1913, he joined the Georgia Power Company and has been connected with the engineering and construction departments since that time. Mr. Hammond has played an important

part in virtually all of the electrical construction work done during the past few years and during the present year has been in charge of the entire engineering department.

SAMUEL INSULL, president of the Commonwealth Edison Company, Chicago, returned from Europe aboard the Cunard liner *Aquitania*, Sept. 9.

D. H. OLNEY, formerly connected with the Louisiana Public Utilities Company, has been appointed commercial manager of the Public Service Company of Oklahoma to succeed A. F. Keller, resigned.

ALFRED ALSAKER, chief engineer of the Delta-Star Electric Company, Chicago, sailed Sept. 11 for a six weeks' visit to Norway, France and Italy to investigate high-tension developments on the Continent.

HARRY M. HITCHCOCK has resigned as publicity manager of the Union Gas & Electric Company, Cincinnati, to join the editorial staff of the Printers' Ink Publications, New York. Mr. Hitchcock was formerly with the New York *World* and at one time was a member of the financial news staff of the New York *Times*.

FRANK D. FAGAN, of the merchandising department of the General Electric Company, Bridgeport, Conn., has been elected vice-president of the Union Electric Company, Pittsburgh. Mr. Fagan had been associated with the General Electric Company for about twenty years and for several years acted as special representative of the International General Electric Company in Japan. He is a native of California.

E. S. WILLIAMS, for the past four years superintendent of overhead construction for the Pacific Power & Light Company at Walla Walla, Wash., has been transferred to the Walla Walla River plant near Milton, Ore., as chief engineer in charge of that plant. He is succeeding E. E. BERG, who has been transferred to The Dalles, Ore., as assistant superintendent of power for the Dalles-Hood River system of the company. CLARENCE SHINN, formerly at Pasco-Kennewick, has been transferred to Walla Walla to succeed Mr. Williams.

LAMAR LYNDON, consulting engineer and an author of some note on various engineering subjects, has recently established residence in Los Angeles. In the course of an active and interesting career Mr. Lyndon has exhibited uncommon versatility, having served in the capacity of manager of foundry and machine works, engineer with a gas and electric company, consultant on numerous engineering enterprises and as arbiter in disputes between contending parties in different engineering undertakings and between cities and public utility corporations. The execution of this extensive work has familiarized him not only with conditions in the United States but also in Japan, China, India, England and France. Mr. Lyndon's contributions to the technical press are of considerable importance, including such books as "Development and Electrical Distribution of Water Power," "Storage-Battery Engineering," "Hydro-Electric Power" and "Rate Making for Public Utilities."

C. L. HOCKMAN, formerly superintendent of the meter and test department of the Utica (N. Y.) Gas & Electric Company, Utica, has become superintendent of the meter department of the Erie (Pa.) Lighting Company. After completing the four-year electrical apprenticeship course of the Westinghouse Electric & Manufacturing Company, Mr. Hockman affiliated himself with the North Adams (Mass.) Light & Power Company as superintendent of the electric meter department. It was in 1921 that he affiliated himself with the Utica Gas & Electric Company.

D. W. BLAKESLEE, for the past eight years electrical engineer for the Jones & Laughlin Steel Corporation, Pittsburgh, has affiliated himself with the Pittsburgh Reflector Company in the capacity of illuminating engineer. Mr. Blakeslee brings to his new position a broad knowledge of electrical, mechanical and civil engineering obtained during seventeen years of experience with large industrial organizations, coupled with academic work at the University of Arkansas and at Yale University. In the course of his career he has been identified with the H. Koppers Company of Pittsburgh, the Westinghouse Electric & Manufacturing Company, the Carnegie Steel Company, the Duquesne Light Company, the Penn Electrical & Manufacturing Company, Irwin, Pa., and the Jones & Laughlin Steel Corporation.

E. N. D'OYLY has been appointed electrical engineer of the Western district of the electrical division of the engineering department of the Byllesby Engineering & Management Corporation to succeed A. H. Tracy, resigned. Mr. D'Oyly had been general superintendent of the electric department of the Western States Gas & Electric Company at Stockton, Cal., since 1924. After being graduated from the University of New Zealand in 1910, he entered the employ of the Western Canada Power Company, where he engaged in hydro-electric construction work. Three years later he joined the Stone & Webster forces in the construction of the Big Creek No. 1 plant of the Southern California Edison Company. Following discharge from military service he returned to California, where he became identified with the Western States Gas & Electric Company.

JOSEPH MCKINLEY has been placed in charge of the power and steam sales division of the general sales department of the Philadelphia Company, directing wholesale power service above 20 kw., steam service and illumination work for industrial and commercial establishments. Mr. McKinley has also been named chairman of an executive sales committee organized to co-ordinate all new business of the sales department. This new general sales department was formed by combining the commercial departments of the Duquesne Light Company and the Equitable Gas Company together with the Equitable Sales Company. ROBERT E. POLK was selected to head the industrial and commercial heating sales division, and H. P. SMITH has become director of the rate division. G. W. OUSLER has been appointed director of the sales engineering division.

JAMES W. PERRY, a vice-president and director of the Johns-Manville Corporation, New York, and since 1902 active in the manufacture and sale of that company's electrical products, has resigned and will retire from active business.

Obituary

HOWARD SNYDER, vice-president of the Maytag Company, Newton, Iowa, died Sept. 4 from pernicious anemia after an illness of two years. Mr. Snyder was 58 years of age.

Z. F. GRAHAM, at one time owner of the electric light plant at Washington, Ind., and founder of the street-railway system in that city, died recently at his summer home at Conway, Mich. Mr. Graham was born in Daviess County, Ind., in 1853.

HARLEY H. HELLER, works manager of the Ford Instrument Company, Long Island City, New York, died at the Greenwich (Conn.) Hospital Aug. 28. Mr. Heller had been identified with the Ford Instrument Company since 1917. His earlier connections included the Henry B. Worthington Company, the Wheeler Condenser Company, the Humpherys Manufacturing Company and the Hill Clutch Company. Mr. Heller was 52 years of age.

GEORGE B. THOMAS of the engineering staff of the Bryant Electric Company, Bridgeport, died Sept. 8 of intestinal trouble. Mr. Thomas had been with that company for more than 25 years, devoting his time especially to designing and improving methods of manufacture. He perfected a number of devices manufactured by The Bryant Electric Company. He was a member of the American Society of Mechanical Engineers.

COLONEL CHARLES J. GLIDDEN, an early associate of the late Alexander Graham Bell in telephone toll-line construction and a pioneer in the consolidation of telephone companies, died at his home in Boston on Sept. 11 at the age of 70. He was a former president of the Erie Telephone Company, promoted the formation of the New England Telephone & Telegraph Company and was an enthusiastic devotee of aëronautics.

Financial and Statistical News

Bond Prices Rise Further Common Stocks as Investment Higher Money Rates

FROM a market standpoint, the inclusion of common stocks in the investment lists sent out by some of the leading financial houses is of more than passing significance. Bond prices have continued to rise until the yield has become unsatisfactory to many investors who are turning to common stocks of the more stable companies. The average price of a representative group of power and light bonds computed by the ELECTRICAL WORLD is now 103.6 against 101.3 at the beginning of the year and 97.4 at the beginning of last year.

From this, however, one is not justified in concluding that by waiting a while bonds can be obtained at lower prices. Security prices are not high today when compared with pre-war levels. Bond prices in Great Britain not so many years ago reached a level representing a yield of slightly over 2 per cent. Many investment authorities look for a long period of lowering money rates. In such an event bond values will represent a worth-while appreciation, since each change of 1 per cent in yield, under present conditions, represents a change of some 25 per cent in values.

The sudden hardening of the call money rate this week to 4 and then to 4½ per cent had nothing more than a temporary effect on utility stocks. The effect was less evident than in the case of the industrial issues. In fact, some issues have made substantial gains during the week. Among these are Edison Electric Illuminating of Boston, which gained ten points to 262; Detroit Edison, which went up to 158, and Pacific Gas & Electric. Somewhat increased activity is evident in the markets for preferred issues of the utilities.

Eight Million Dollars Saved by Consolidation

A saving of at least $8,000,000 between 1915 and 1926 as a result of consolidation of the subsidiary companies of the Middle West Utilities Company is announced in a statement made public recently. It is shown that since the period was one of a depreciated dollar and rising prices the saving was not due to ordinary price movements. The company cites the following advantages of consolidation: First, ability of companies to engage competent engineers; second, ability to carry on economical financing by small units; third, the creation of a more diversified demand in serving a larger territory. The article concludes: "When electricity was first applied as a motive power in industry, its economical distribution was limited to short distances. Later, with the development of improved methods of distribution, it was seen to be feasible to achieve a sufficiently diversified demand in non-metropolitan sections by building a single efficient generating plant with which to serve the electrical requirements of the wide surrounding territory. Larger, and consequently more efficient, electric systems were formed as combinations of local systems to operate over broad areas and serve a large number of small towns—a marked improvement from an operating standpoint. From a financial standpoint, a solution was found by bringing a number of such electric service companies under control and direction of a utility investment company."

European Utilities Make Bid for American Capital

Some Countries, However, Have Ample Funds—Huge Development Projects Under Way—Railways Being Electrified in Several Nations

RAILWAY and industrial electrification in many of the European countries is proceeding at a pace which is surprising to many American observers, according to Vice-President Bogert of Eastman, Dillon & Company, who has just returned from an extended trip throughout the Continent. This has led to keen activity in the development of hydro-electric sources and the building of high-tension transmission lines. With regard to the source of capital to finance these projects, it is Mr. Bogert's observation that while large amounts of American capital will be needed in some countries, investment funds will be ample to meet the need in others.

Naturally the situation differs widely in different countries. Germany needs capital in large amounts but is handicapped in borrowing here because of the effect which a large inflow of funds might easily have upon suggested indemnity payments under the Dawes plan. A committee has been appointed to investigate and pass upon these loans as they come forward. Germany is introducing high-voltage lines to convey power to the industrial areas—to link the South German water-power area with the Rhenish lignite section, for example. Hollow copper cables which comply with the need of high-tension alternating current for a conductor with large, slightly curved surfaces are being used. With a transmission pressure of 380,000 volts, it is expected to transmit power ranging from several hundred thousand to a million kilowatts over distances of 500 km. to 1,000 km. International linking up of water-generated and steam-produced electrical energy is also advancing toward realization.

France, on the other hand, as a result of increased saving habits, appears to have ample capital to finance her own electrical developments, which are being carried out on a tremendous scale. Such funds, moreover, can be obtained in France at a favorable rate in comparison with the price of money in the United States and elsewhere. France has under way at the present time the electrification of a large mileage of her railways.

Switzerland, too, is promoting electrical development for the same purpose, and the need for capital appears to be more pressing there. In some of the smaller countries farther east, notably Hungary, keen activity in electrical development is closely related to the industrial recovery evident in many directions. In Spain several large sources are being harnessed. The drying up of rivers during summer necessitates the building of storage reservoirs in this territory. Italy, of course, has made probably greater strides than any European country in the development of power sources and in the electrification of railroads and industry.

Company Reports

Name of Company	Gross Earnings Twelve Months Ended July 31 1927	1926
American Power & Light	$62,139,515	$56,748,495
American Wtr. Wks. & Elec.	47,551,693	43,643,496
Cities Service	30,078,734	21,883,728
Electric Power & Light	51,637,056	48,565,723
Idaho Power	2,944,034	2,855,068
People's Light & Power	3,628,931	3,496,489

Power and Light Bond Defaults Are Negligible

Only one default out of more than 4,000 corporate bond issues outstanding in the past three years is the remarkable record of the power and light industry, according to an analysis just finished by the Standard Statistics Company. Out of more than 250 issues on this list, only three were electric light and power companies. Two of them were Canadian companies afterward reorganized to the satisfaction, apparently, of the bondholders. The third was an American company, the Colorado Springs Light, Heat & Power

Company, which, owing to severe competition with a municipally owned gas and electric plant, was, at the expiration of its franchise, compelled to sell to the city.

NORTH BOSTON LIGHTING TO REDUCE PAR OF PREFERRED. — Trustees of the North Boston Lighting Properties have voted to recommend to shareholders that the par value of the preferred stock be reduced from $100 to $50, that two shares of $50 par preferred be issued in exchange for each $100 per share, and that in order to maintain relative voting strength (preferred stock having voting rights) an additional share of no-par common be issued for every common share outstanding. A meeting of the stockholders will be called in the near future to act on this recommendation. There are now under the present capital set-up 114,039 shares of $100 par preferred outstanding and 186,611 shares of no-par common. After the proposed recapitalization is carried into effect there will be outstanding 228,078 shares of $50 par preferred and 373,222 shares of no-par common.

Hartford Electric Light Company Ownership Widely Scattered

RADIO has at last been pressed into service in promotion of customer campaigns. At a special meeting of the stockholders of the Hartford Electric Light Company at Hartford, Conn., last week, President Samuel Ferguson broadcast through Station WTIC, (Travelers Insurance Company), announcing important news to the shareholders. Pointing out that there were 4,200 shareholders owning the company, Mr. Ferguson made it clear that a hall ample for a full attendance of stockholders in person would not be easily obtainable.

An amendment to the company charter allowing capital increases up to $30,000,000, the present capital outstanding being $28,000,000, was adopted by stockholders present in person in the hall. Reference was made also to the customer dividend of 40 per cent on October bills. This is the third year such dividends have been voted, the amount having been 50 per cent the first year and 60 per cent last year. Out of the 4,200 stockholders, it was pointed out that only 97 owned stocks of 200 shares or more. The holdings of these 97 large stockholders amount to only 25 per cent of the total stock. The other 75 per cent, or far more than enough to control, is scattered among 4,100 persons. In discussing the advisability of depositing stock in accordance with announcements already made, President Ferguson said: "A few years ago the largest part of the stock was owned by not more than one hundred persons, and of this one hundred, possibly as many as ten might be described as very large stockholders. Under these conditions, it was obvious that these men who were so largely interested would vote for their own best interests and that it didn't matter how the little fellow voted, or whether he voted at all. All he had to do was to follow along, because the big ones were in a position to be conversant with the affairs of the company and

Stock Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Sept. 13	Low 1927	High 1927
ABITIBI PWR. & PAPER, 4% com.—no par	108½	83	109½
Adirondack Pwr. & Lt.—7% pf.	112½	107	113½
Adirondack Pwr. & Lt.—8% pf.	115	112	116
Ala. Pwr., $7 cum. pf.—no par	112	107	112½
Allis-Chalmers Mfg., 7% pf.	m111½	109	112½
Allis-Chalmers Mfg., 6% com.	112½	88	114½
Aluminum Co. of Amer., com.	99	67½	105½
Aluminum Co. of Amer., 6% pf.	103	101½	104½
Amer. & Foreign Pwr. pf. 25% pd.	m110	....	....
Amer. & Foreign Pwr., 7% pf.—no par	107	88½	108
Amer. & Foreign Pwr., com.—no par	26½	18½	26½
Amer. Bosch Magneto, com.—no par	25	13	25
Amer. Brown Boveri Elec†	10	5½	39½
Amer. Brown Boveri Elec., pf. $7	50	40	98
Amer. Gas & Elec., 6% pf.—no par	102½	95½	101½
Amer. Gas & Elec., com.†—no par	107½	68½	109½
Amer. Lt. & Trac., 6% pf.	112	112	120
Amer. Lt. & Trac., new com.	179½	164½	179½
Amer. Pwr. Lt., 6% pf.	104	97½	106½
Amer. Pwr. & Lt., com.†—no par	66½	54	67½
Amer. Pub. Serv., 7% pf.	a100½	94	104
Amer. Pub. Serv., com.†	70	....	....
Amer. Pub. Utilities, 7% pfd. pf.	k 86½	73	88½
Amer. Pub. Utilities, 7% pr. pf.	k 93	88	93
Amer. Pub. Utilities, com.	k 53	65	70
Amer. States Sec., A.	4	2½	4
Amer. States Sec., B.	4	2½	4½
Amer. Superpwr., 6% pfd. pf.—25	29½	26½	29
Amer. Superpwr., 6% 1st pf.	l 98	....	....
Amer. Superpwr., Class A†—no par	38½	27½	38½
Amer. Superpwr., Class B†—no par	39½	28½	39½
Amer. Wtr. Wks. & Elec., 7% pf.	m111½	104½	111½
Amer. W. W. & E., com. new—no par	55½	46	55½
Anaconda Copper cap. $3.	47½	41½	49½
Appalachian Electric Pwr., 7% pf.	104	100	105
Appalachian Elec. Pwr., com.	m 78	77	83
Arizona Pwr., 7% pf.	k 72	77	84½
Arizona Pwr., com.	m 20	....	....
Arkansas Pwr. & Lt. 7% pf.	105	....	....
Assoc. Gas & Elec., $3.50—50	50½	....	....
Assoc. Gas & Elec., pf.—$6—no par.	93	85	93
Assoc. G.&E., Class A, 10—no par.	42½	35	43½
BABCOCK & WILCOX, 7% com.	114	113	124
Binghamton L., H. & P., $6 pf.	98	93	100
Birmingham Elec., pf.—$7—no par.	108	105	109
Blackstone Valley G. & E., 6% pf.	106	103	105
Blackstone Valley Gas & Elec., 10% com.—50	143½	98	154½
Blaw-K nox, com.†	t 89	70	95
Brazilian Trac., Lt. & pwr., com.†	f191	....	....
Broad River Pwr., 7% pf.	102	97	103
Brooklyn Edison, 8% com.	180	148½	184½
Buffalo, Niagara & East. Pwr., $1.60 pf.—25	l 26	....	....
Buffalo, Niagara & East. Pwr. com. $1—no par	l 38	....	....
CALIFORNIA ELEC. GENERATING, 6% pf.	97	96	99½
California Ry. & Pwr., 7% pf.	135	125	150
Carolina Pwr. & Lt., pf.—$7—no par	f110	107 ¶	109
Central & S.W. Util., $7 pf.—no par	a 96½	92½	97½
Central & S.W. Util., pr.in.$7 pf.—no par	a102½	98½	104½
Central Ariz. Lt. & Pwr., 8% pf.	k 97	95	98
Central Ark. Ry. & Lt., 7% pf.	106	100	104
Central Ill. Pub. Serv., $6 pf.	a 92½	88½	95½
Central Ind. Pwr., 7% pf.	92	86	95
Central Pwr. & Lt., 7% pf.	101	100½	103
Central States Elec., 7% pf.	98½	92½	100
Central States Elec., com.†	m200	....	....
Century Elec., 6% com.	m115	115	115
Chicago Fuse Mfg., com.—$2.50 no par.	m 35½	30	35½
Cincinnati Gas & Elec., 5% com.	a100½	96½	100½
Cities Service, $6 pf.—no par	i 90½	87½	90½
Cities Service, pf. B—no par	i 8½	7½	8½
Cities Service, pf. BB—no par	i 82	78½	85½
Cities Service, com.—20	i 49½	40½	58½
Cities Service, Bks. Shrs.—10	i 24½	22½	29½
Clarion River Pwr., 8% pf.	95	....	....
Cleveland Elec. Illg., 6% pf.	110½	108	112
Cleveland Elec. Illg., 10% com.	322	285	330
Columbia Gas & Elec., 6% pf.	107	99½	107½
Columbia G. & E. com. $5—no par.	94½	82½	98½
Columbia Ry., Gas & Elec., 6% pf.	m 98	97	100
Columbus Elec. & Pwr., $2 com.—no par	64	....	....
Columbus Ry., Pwr. & Lt., 6% 1st pf.	103	98½	104
Columbus Ry., Pwr. & Lt., 6½% pf. B	101½	96	103½
Columbus Ry., P. & L., com.—no par	100	75	105
Commonwealth Edison, 8% com.	a155½	138	155
Commonwealth Pwr., 6% pf.	100½	91½	101½
Commonw'th Pwr., $2, com.—no par	60	48½	61½
Conn. Lt. & Pwr., 8% pf.	121	119	123
Conn. Lt. & Pwr., 7% pf.	117	112	118
Cons. Gas of N. Y., pf.	100	93	100
Cons. Gas of N. Y., com $5—no par.	119½	94	119½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6% pf.	e110	106½	110½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6½% pf.	e113½	110½	114½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 7% pf.	e117	112½	117
Cons. Gas, Elec. Lt. & Pwr. of Balti., 8% pf.	e129½	127	130½
Cons. Gas, Elec. Lt. & Pwr. of Balti., com. $2.50—no par.	e 63	51	63½
Consolidated Pwr. & Lt., 7% pf.	105	100	106
Consumers Pwr., 6% pf.	103	100	102
Consumers Pwr., 6.6% pf.	105½	103	105½
Continental Gas & Elec., 8% pfd. pf.	108	103	106½
Continental Gas & Elec., 7% pr. pf.	102	100	103
Conti. G. & E. com. $4.40—no par.	220	210	225
Crocker Wheeler, com.†	25	30	38
Crocker Wheeler, 7% pf.	82	78	88
DALLAS PWR. & LT., 7% pf.	109	107	110½
Dayton Pwr. & Lt., 6% pf.	107	101	107
Detroit Edison, 8% com.	157½	133½	160½
Dubilier Condenser, com.—no par.	4½	2½	5½
Duquesne Lt., 7% pf.	k115½	114½	116½
EASTERN NEW YORK UTIL., $7 pf.	107	102	104½
Eastern New York Util. com.	65	70	75
Eastern States Pwr., $7, com.	9	9	13
Eastern States Pwr., pf.	90	90	95
East. Tex. Elec., 7% pf.	106	106	108
Edison Elec. of Boston, $12 com.	d261½	217	267
El Paso Elec., 7% pf.	108	105	107½
Elec. Bond & Share, 6% pf.	d108½	105½	109½
Elec. Bd. & Sh. Sec., com. $1—no par	l 77½	67½	79½
Electric Household Util.†	a 13½	11	15½
Elec. Investors, 6% pf.—no par.	96	92	97
Elec. Investors, com.†—no par.	40½	32½	42
Elec. Investors, 10% pd. receipts	m 15	....	....
Elec. Pwr. & Lt., etfs. pf.	106½	96	106
Elec. Pwr. & Lt., etfs., 40% pd.	k117	103½	116
Elec. Pwr. & Lt., etfs, full pd.	m114	108½	111½
Elec. Pwr. & Lt., etfs., com.—no par.	26½	16½	28
Elec. Refrig. cap.†	14½	12½	37½
Elec. Ry. Securities, com.—no par.	6½	....	....
Elec. St. Battery com. $5.25—no par	69	63½	79½
Elmira Wtr., Lt. & R. R., 7% pf.	103	99	101½
Emerson Elec., pf.	m109	107½	111
Empire Pwr., pfc.†	35	....	....
Engr. Pub. Serv., $7 pf.—no par.	105	93½	106½
Engr. Pub. Serv., com.—no par	34½	21½	36
Eureka Vacuum Cleaner, com. $4—no par	71½	50	77
FAIRBANKS MORSE, 7% pf.	k108	107½	112
F.-M., com.—$3—no par.	k 38½	37½	43½
Federal Lt. & Trac., com. $1.40	42½	37½	47
Federal Lt. & Trac., $6 pf.—no par.	k 99	91½	100
Ft. Worth Pwr. & Lt., 7% pf.	d111	108	112
GALVESTON-HOUSTON ELEC. 6% pf.	70	68	72
Galveston-Houston Elec., com.	32½	26	32
Gen. Elec., $3 com.—no par.	140½	81	146½
Gen. Elec., special—6%	11½	11	11½
Gen. Gas & Elec. (Del.) com. A, $1.50—no par	41	34	47½
Gen. G.&E. (Del.) com. B—no par.	m 45	35½	44½
Gen. G.&E. (Del.) pf. A, $8—no par.	k116	113½	120
Gen. G.&E. (Del.) pf. A $7—no par.	k110	100	109½
Gen. G.&E. (Del.) pf. B $7.	k104	96	105
Gen. Pub. Serv., $7 cum. pf., no par.	k107	102	106
Gen. Pub. Serv., com., no par.	10½	11½	15½
Ga. Lt., Pwr. & Rys., 6% pf.	92	87	96
Ga. Lt., Pwr., & Rys., com.	m 50	50	80
Ga. Ry. & Pwr., 8% pf.	k123	119	125
Ga. Ry. & Pwr., 7% pf.	k113½	106	110
Gt. Western Pwr., 7% pf.	k102½	....	....
IDAHO PWR., 7% pf.	107	103	109
Ill. No. Utilities, 6% pf.	a 96	92	97
Ill. Pwr. & Lt., 7% pf.	101½	99	101½
Ingersoll Rand com. $8.	k 89½	88½	96½
Int. Combus. Engr., com. $2—no par	52½	43½	64
Int. Util., Class A—$3.50—no par.	43	28	45½
Int. Utilities, Class B—no par.	6½	3	7½
Interstate Pwr., pf.—$7—no par.	94	93	98
Interstate Pub. Serv., 7% pf.	99½	98	99½
Iowa Ry. & Lt., 7% pf.	98	97	99
JERSEY CENTRAL PWR. & LT. CO., 7% pf.	103	97½	103
Johns-Manville, com.†—no par.	112½	55½	120½

Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco; iPittsburgh; jWashington. kBid price Saturday, Sept. 10. lBid price Wednesday, Sept 14. mLatest quotations available. †Dividend rate variable.

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Sept. 13	Low 1927	High 1927
KANSAS CITY PWR. & LT. pf.$7	*k*115	112	115½
Kansas Gas & Elec., 7% pf.	*l*107	103	107
Kentucky Hydro-Elec., 7% pf.	*a* 97½	94½	100
Kentucky Sec.,6% pf.	86	83	87
Kentucky Sec., 5% com.	109	110	115
Kentucky Utilities, 6% pf.	99½	95	98½
Keystone Pwr. & Lt., pf.	*m* 98	95	100
LACLEDE GAS LT., 12% com.	*k* 230	173½	267½
Lehigh Pwr. Sec., com.—no par.	20½	15	21½
Long Island Ltg., 7% pf.	113	107½	113
Long Island Ltg., com.†—no par	154	139	153
Los Angeles Gas & Elec., 6% pf.	102	98	104½
Louisville Gas & Elec., cl. A. $1.75	26½	23½	27½
MAN. ELEC. SUPPLY, cap. $5 —no par	55	50	132
Manila Elec., com.†—no par	*k* 47	40	50
Maytag Mfg., com. .50—no par	32½	23½	34½
Memphis P. & L., pf.—$7—no par	109½	107	109
Metropolitan Ed., pf.—$6—no par	100½	93	100
Metropolitan Ed., pf.—$7—no par	108	104	108
Metropolitan Ed., com. $5—no par	70	60	72
Middle West Utilities, 6% pf.	*a*113½	110½	113½
Middle West Util., 8% pr. lien	*a*120½	117½	122½
Middle West Util., com. $6—no par ex. div.	*a*114½	108	117½
Midland Utilities, pr. ln. 7% pf.	*a*106	97½	106
Midland Utilities, 6% pf. A	*a*102½	92½	102½
Milwaukee Elec. Ry. & Lt., 7% pf.	*k*102	100	103
Milwaukee Elec. Ry. & Lt., 6% pf.	*k* 99	98	101½
Minn. Pwr. & Lt., 7% pf.	*l*107	104	107
Miss. Pwr. & Lt., $8 pf.	*m*101	106	103
Miss. River Pwr., 6% pf.	102	94	103
Miss. River Pwr. 3% com.	62	....	..
Mohawk Hudson Pwr., 1st pf.—$7 —no par	109	100	109
Mohawk Hudson Pwr., 2d pf.—$7 —no par	110	98	112
Mohawk Hudson Pwr., com.—no par	31½	20½	32½
Montana Pwr., 7% pf.	*m*106	118½	106½
Montana Pwr., 5% com.	102½	81½	106½
Montreal Pwr., 7½% com.	*f* 93½	....	....
Mountain States Pwr., 7% pf.	100	97	101
Mountain States pwr., com.†	18	....	....
NASSAU & SUFFOLK LTG., 7% pf.	107	98	105
National Carbon, 8% pf.	*m*139½	130½	139½
National Elec. Pwr., A†	*a* 24½	23½	25½
National Lt., Ht. & Pwr., com.	24	....	....
National, Light, Ht. & Pwr., 5% pf.	70	....	....
National Pwr. & Lt., pf.—$7—no par	107	101	108½
National Pwr. & Lt., com.†—no par.	24½	19½	26
National Pub. Serv., 7% pf.	*k* 98	93	100
National Pub. Serv., 7% pfc., pf.	*k*113	108	115
National Pub. Serv., A com. $1.60— no par.	22	18½	24
National Pub. Serv., B com.—no par	*k* 17½	14	20½
Nebraska Pwr., 7% pf.	*l*110	106	109
Nevada-Calif. Elec., com.	*k* 26	22	27
New Brunswick Pwr., 4% pf.	60	....	....
New Eng. Pub. Serv., pr. ln. pf. $7..	102	98½	101
New Eng. Pub. Serv., pf. $7.	97	95	97½
New Orleans Pub. Serv.—7% pf.	104½	103	105½
N. Y. & Queens Elec. Lt. & Pwr., 5% pf.	90	91	97
N. Y. Central Elec., 7% pf.	102½	101	104
Newport News & Hampton Ry., Gas & Elec., 5% com.	109	....	....
Newport News & Hampton Ry., Gas & Elec., 7% pf.	109	....	....
Niagara Falls Pwr., 7% pf.—25	*k* 28½	27½	29½
Niagara, Lock. & Ont. Pwr., 7% pf.	111	110½	113
No. Amer., 6% pf.—50	52½	50	55
No. Amer., com.—10	56	45½	58½
No. Amer. Edison, $6 pf.—no par	102½	96½	102½
No. Caro. Pub. Serv., pf.—$7—no par	100½	93	102½
Northeastern Pwr., com	19½	14½	20½
No. N. Y. Utilities, 7% pf.	106	103	109
No. Ohio Pwr., com.—no par.	15½	9½	15½
No. Ohio Trac. & Lt., 6% pf.	83	78	81
No. Ont. Lt. & Pwr., 6% pf.	*k* 91	84	95
No. Ont. Lt. & Pwr., 4% com.	72	73	78
No. States Pwr., (Del.) 7% pf.	105	101	107½
No. States Pwr., (Del.) 8% com.	125½	109½	126½
No. Texas Elec., 6% pf.	64	65	70
No. Texas Elec., com.	20	27	36
OHIO BRASS, com. B $4—no par.	82	74	85
Ohio Brass, 6% pf.	105	100	105
Ohio Pwr., 6% pf.	100½	96	103
Ohio Pub. Serv., $6 pf.	98	95	96½
Ohio Pub. Serv., 7% pf.	106	103	109
Ohio River Edison, 7% pf.	108½	103	109½
Oklahoma Gas & Elec., 7% pf.	100½	....	....
PACIFIC GAS & ELEC., 6% pf.	26½	24½	26½
Pacific Gas & Elec., 8% new com.	41½	31	42½
Pacific Pwr. & Lt., 7% pf.	*l*104½	102	104
Penn Cent. Lt. & Pwr., $5 pf.—no par	*c* 77½	75½	77½
Penn-Ohio Edison, 7% pf.	103½	97½	104½
Penn-Ohio Elec., 7% pf.	*m*101½	98	100
Penn-Ohio Pwr. & Lt., 7% pf.	102	99	103
Penn Pwr.& Lt.—$7—no par.	*l*109½	107	109
Penn Wtr. & Pwr., 8% com., new	*e* 57½	47½	58½
Phila. Co., 6% pf.—50.	*k* 53	50	53½
Phila. Co., com.—50.	*k* 103	85½	110
Phila. Elec., 8% com.—25.	*c* 56½	46½	57½
Portland Elec. Pwr., 7% pf.	99	97½	101
Portland Elec. Pwr., 6% pf.	81	78	83
Portland Elec. Pwr., 6% 2d pf.	58	55	70
Portland Elec. Pwr., com	28	22	30
Potomac Elec. Pwr., 6% pf.	*m*108½	....	....
Pwr. Corp. of N. Y., com. $1—no par	*m* 79	....	....
Pwr. Sec., pf.—no par.	*k* 29	28	33
Pwr. Sec., com.—no par.	*k* 6	5	8
Public Serv. of Colorado, 7% pf.	*l*100½	....	....
Pub. Serv. of N. J., 6% pf.	100½	98½	101½
Pub. Serv. of N. J., 8% pf.	130	125	132
P. S. of N. J., $2 com.—no par.	44	32	46½
Pub. Serv. of No. Ill., 6% pf.	*a*106½	101½	106½
Pub. Serv. of No. Ill., 7% pf.	*a*117	112½	117
P. S. of No. Ill., com. $8—no par	*a*142½	130½	143
Pub. Serv. of No. Ill., $8 com.	*a*141½	132	142
Pub. Serv. of Okla., 7% pr. ln.	100	99	100½
Pub. Serv. Elec. & Gas, 6% pf.	*k*106½	102	108½
Puget Sound Pwr. & Lt., 7% pr. pf.	106½	105	107
Puget Sound Pwr. & Lt., $6 pf.—no par	87	....	....
Puget Sound Pwr. & Lt., com	30	29½	36
RADIO CORP. OF AMER., $3.50 pf.—50	*k* 54½	49	54½
Radio Corp. of Amer., com.—no par.	64½	41½	68½
Republic Ry. & Lt., pf.	*m*120	....	....
Republic Ry. & Lt., com.	*m*135	112	135
Rochester Gas & Elec. 6% pf. D	*k*104½	101	103½
Rochester Gas & Elec., 7% pf. B	104	105	107
Rochester Gas & Elec., 6% pf. C.	104½	101½	103½
SAFETY CABLE, com. $4.	65	52½	74½
San Joaquin Lt. & Pwr., 7% pr. pf.	106	105	108
St. Joseph Ry., L., H. & P., 5% pf.	72	70	73
Servel Corp.	*k* 78cts	52cts	10½
Sierra Pacific Elec., 2% com.	*k* 25½	24½	28½
Sioux City Gas & Elec., 7% pf	103	99	104
Southeastern Pwr. & Lt., pf.—$7 no par	*l*108	....	....
Southeastern Pwr. & Lt., pfc. pf.	*l* 83	....	....
Southeastern Pwr. & Lt., com.—no par	36½	29½	38½
So. Calif. Edison, 8% pf.	39	36½	40
So. Calif. Edison, 7% pf.	*k* 28½	27½	28½
So. Calif. Edison, 6% pf.	25½	24½	26
So. Calif. Edison, 8% com	38½	31½	39½
Southern Cities Utilities, 7% pf.	*k* 70	67	90½
Southern Cities Utilities, com. $4.	*m* 31½	23½	42½
Southwestern Lt. & Pwr., A $3.	63	60	65
Southwestern Lt. & Pwr., B.	63	60	65
Southwestern Lt. & Pwr., $6 pf.	86	83	91½
Southwestern Pwr. & Lt., 7% pf.	110	104	110
Springfield (Mo.) Ry. & Lt., 7% pf	102	95	102
Standard Gas & Elec., 8% pf	*k* 64½	57½	64½
Standard Gas & Elec., 7% pr. pf.	108	103	110
Standard G. & E., com. $3.50—no par	64½	54	65½
Standard Pwr. & Lt., 7% pf.	100	98	102½
Staten Island Edison, pf.—$6—no par.	100	99	101
Superheater, $6 com.—no par.	176	166	181
Syracuse Lighting, 7% pf.	105	103	....
Syracuse Lighting, 8% pf.	115½	....	....
Syracuse Lighting, 8% com.—no par	*m*300	....	....
TAMPA ELEC., com. $2.	59	....	....
Tenn. Elec. Pwr., 6% pf.	98	92	99
Tenn. Elec. Pwr., 7% pf.	108	103	109
Terre Haute, Ind. & East. Trac., 5% pf.	26	20	30
Terre Haute, Ind. & East. Trac., com	1	1	3
Tex. Pwr. & Lt., 7% pf.	*l*110	106	110
Tide Water Pwr., 8% pf.	109	105	110
Timken Roller Bear., com.—$4 no par.	125½	78	142½
Toledo Edison, 8% pf.	115	115	118
Toledo Edison, 7% pf.	*l*107½	....	....
Toledo Edison, 6% pf.	*k* 98	95	97
Toledo Edison, 6% com.	98	....	....
Tri-City Ry. & Lt., 6% pf.	98	90	97
UNITED GAS & ELEC., 6% pf.	101	98	102
United Gas & Elec., com.—no par.	*m* 57	....	....
United Gas & Elec. (N. J.) 5% pf.	72	70	73
United Gas Impr., 8% com.—50.	*c* 117½	89½	118½
United Lt. & Pwr., pf.—$4—no par.	54½	50½	57
United Lt. & Pwr., pf.—$6.50—no par.	97	87	97½
United L. & P., com. A .48—no par.	14½	12½	15½
United L. & P., com. B .48—no par.	*k* 19	16	21
Utah Pwr. & Lt., 7% pf.	*l*107	104	108½
Utica Gas & Elec., 7% pf.	105	105	106½
Utica Gas & Elec., 8% com.	200	....	....
Utilities Pwr. & Lt., 7% pf.	95½	93	100
Utilities Pwr. & Lt., com. A $2.	31	27	34
Utilities Pwr. & Lt., com. B $1—no par.	19½	13½	21½
VERMONT HYDRO-ELEC., 7% pf.	99	95	100
Virginia Elec. & Pwr., 7% pf.	107	105	110
Virginian Pwr., 7% pf.	108	....	....
Virginian Pwr., com.	75	....	....
WAGNER ELEC., 7% pf.	*b* 88	68	90
Wagner Elec., com.—no par.	*b* 33	18½	39½
Washington Ry. & Elec., 5% com.	270	180	275
Washington Ry.& Elec.,5% pf.	90½	....	....
Washington Wtr. Pwr., 8% com.	164	136	168
West Penn Elec., 7% pf.	112	102	112
West Penn Elec., Cl. A $7.	110	97½	110
West Penn Pwr., 7% pf.	114½	111	118
West Penn Pwr., 6% pf	108	100½	108½
West Virginia Lt., Ht. & Pwr., 7% pf	92	94	96
West Va. Utilities, 7% pf.—50	*m* 90	48	51½
Western Pwr., 7% pf.	103	98	103
Western States Gas & Elec., 7% pf	103	96	105
Western States Gas & Elec., com.	38	....	....
Westinghouse Elec. & Mfg., 8% com. —50.	86½	67½	89½
Weston Elec. Instrument, Cl. A $2 —no par.	31½	30	34½
Weston Elec. Instrument, com.—no par.	*k* 12½	12½	18½
Wheeling Elec., 6% pf.	101	95	104
Worthington Pump, 7% pf. A	*k* 52	46	61½
Worthington Pump, 6% B.	*k* 45½	40	54½
Worthington Pump, com.	35	20½	46
YALE & TOWNE com. $5—25	*k* 81	70½	84½

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f* Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid price Saturday, Sept. 10. *l*Bid price Wednesday, Sept 14. *m*Latest quotations available. †Dividend rate variable.

owned enough shares of stock to control. This last is the important point—the big fellow knew what was best to do and had the power to do it. Today he knows what is best but no longer has vested in him the power to do it."

New Issues Total $67,000,000

During the week ended Sept. 15 offerings of electric light and power securities totaled $67,000,000, debentures, preferred stock and mortgage bonds all being included in the new flotations which appeared.

The most substantial issue was offered by the Southern California Edison Company, an offering amounting to $30,000,000 and consisting of refunding mortgage gold bonds priced at 100 and interest, yielding 5 per cent. Another large offering was made by the United Light & Railways Company in the form of 5½ per cent gold debentures, priced at 99½ and accrued interest to yield about 5.53 per cent, a piece of financing involving a total of $25,000,000. These debentures dated Aug. 1, 1927, mature Aug. 1, 1952. Proceeds will be used to reimburse the company for expenditures made in connection with the acquisition of certain of its holdings and for other corporate purposes.

The preferred-stock offering was made by the West Penn Electric Company to the amount of $8,300,000. This 6 per cent cumulative preferred stock, having a par value of $100, was priced at $100 per share and accrued dividend and is preferred as to assets and dividends, equally with the 7 per cent cumulative preferred stock, over all other classes of stock.

The Central Power Company issued first mortgage 5 per cent gold bonds, series D, totaling $3,200,000, the price being 96¼ and interest, yielding about 5.25 per cent.

The Queens Borough Gas & Electric Company issued refunding mortgage gold bonds totaling $1,200,000 at 103½ and accrued interest, to yield over 4.75 per cent.

Westinghouse Owns No Stock in Philadelphia Electric

Contrary to a statement which appeared in last week's issue of the ELECTRICAL WORLD, the Westinghouse Electric & Manufacturing Company has no stock interest in Philadelphia Electric Company. "We have no stock interest in the Philadelphia Electric Company or the United Gas Improvement Company, and, therefore, have no part in any merger operations in the Philadelphia district," President E. M. Herr of Westinghouse said to ELECTRICAL WORLD this week.

Business News and Market Conditions

Changes Are Announced by Electrical Committee

Various changes announced by the electrical committee of the National Fire Protection Association are as follows:

Dr. John Price Jackson reports his probable retirement as a member and the appointment of W. T. Morrison of the New York Edison Company in his place as the representative of the American Institute of Electrical Engineers. The committee on Article 5 has secured the appointment of a new technical subcommittee on Section 506 (underfloor raceways). C. S. Cahaskie, chief electrical inspector of the New York Board of Fire Underwriters at 85 John Street, is chairman. The other members are A. B. Campbell, Allan Coggeshall, Arthur Halsted, Eugene Kretzer, H. F. Richardson, Ralph Ward, A. M. Waller (temporarily) and H. S. Warren. The committees on Articles 5 and 9 purpose to hold meetings in Boston during the first week of October.

A. Penn Denton has resigned as chairman of committee on Article 12 (switches), but will continue a member of the committee. A new chairman has not been appointed, but in the meantime a member of the committee, C. A. Bates, Bryant Electric Company, Bridgeport, Conn., has been asked to direct its affairs. A. B. Campbell has succeeded M. V. Lovell as a member of the technical sub-committee of the committee on Article 37 (radio). A new personnel has been provided for the committee on Article 38 (signs and outline wiring), as follows: George L. Swan, National Board of Fire Underwriters, 85 John Street, New York, chairman, and W. H. Greenlaw, A. G. Hall and A. B. O'Day. A new personnel has been provided for the committee on Article 39 (theaters and motion picture houses). Mr. Swan is likewise chairman of this committee and is associated with W. Creighton Peet, Victor Tousley and F. D. Weber as members.

The electrical committee also calls special attention to the rules of procedure adopted at the annual meeting, February, 1927, which provide that suggestions for code changes must be filed with the committee chairman before Oct. 1 to be assured of attention by the appropriate article committees for action the following February.

Export Declarations

Compilation of American electrical exports by commodities is a phase of industrial statistics which is undertaken by the Department of Commerce for the electrical manufacturers. To be of most value proper care must be exercised by the shippers in coding export declarations in order that the number of items included in the miscellaneous class may be cut down. The customs statistics section in New York has issued a bulletin to export verification clerks asking them to take care so to code export declarations that the percentage of this miscellaneous class can be reduced. A great many items which should come under the proper classification are now being listed in the miscellaneous class. Manufacturers are asked to co-operate in improving this service of the Department of Commerce.

Standardization of Electric Motor Frames

Standardization of certain important dimensions permitting interchangeability of electric motors of different makes has made a forward step, according to an announcement by the American Engineering Standards Committee, with the recent acceptance by two prominent organizations, the American Society of Mechanical Engineers and the National Electrical Manufacturers' Association, of joint leadership in the development of such standards.

This movement has been brought about owing to variation of sizes among different makes, which has required that specific and detailed information be obtained with each new application and that significant changes in design be made to accommodate some particular make of motor. Sometimes, as in the case of breakdown of equipment in service, serious inconvenience has been caused, due to the impracticability of using a motor of any other make than the one originally supplied.

The National Machine Tool Builders' Association, which found diversity in motor dimensions a problem of particular difficulty in its industry, filed the original request to have the subject taken up by the American Engineering Standards Committee. A conference to which all parties interested in this subject were invited was called by the latter body, at which the following scope for the work was recommended:

(a) A series of standard dimensions for the distance from the base to center of shaft (shaft height).

(b) A series of standard distances between bolt holes, at right angles to the shaft.

(c) A series of standard distances between bolt holes, parallel to shaft.

(d) Certain definite combinations of a shaft height with any or both of the distances between bolt holes as mentioned under (b) and (c).

(e) Maximum diameter and length of the motor.

Upon recommendation by a special committee appointed by the conference, the National Electrical Manufacturers' Association and the American Society of Mechanical Engineers were appointed joint sponsors for the project. These bodies are now proceeding to the organization of a sectional comittee to take up the technical work.

Domestic Pumps and Water Systems

Shipments of domestic pumps and water systems during June, as reported to the Department of Commerce by 32 manufacturers, aggregated 8,410 water systems, 45,922 pumps and 12,788 cylinders shipped separately. The accompanying table presents a comparative statement of shipments for the past eighteen months. Prior to January, 1927, statistics on pumps were collected by the Federal Reserve Bank of Chicago.

SHIPMENTS OF DOMESTIC PUMPS AND WATER SYSTEMS

	Water Systems, Electrically-Driven					
			Shallow-Well			
	Deep-Well (3-Hp. and Smaller)		Under 500 Gal. per Hour		500 Gal. per Hour and Over	
Year and Month	Number of Units	Net Sale Price	Number of Units	Net Sale Price	Number of Units	Net Sale Price
1926						
January	646	$57,417	4,357	$345,528	264	$33,024
February	541	45,034	3,373	261,487	140	24,294
March	587	61,125	4,555	359,241	300	33,474
April	709	76,412	4,660	351,743	254	33,484
May	755	85,200	5,538	433,097	335	42,276
June	1,051	117,213	6,466	481,477	444	58,112
Total (6 months)	4,289	$442,401	28,949	$2,232,573	1,737	$224,664
July	1,076	$117,670	5,937	$435,669	413	$47,015
August	1,283	133,895	5,667	409,467	288	33,834
September	1,352	121,625	5,118	374,300	346	29,915
October	1,019	100,834	5,474	385,976	298	24,927
November	865	87,285	4,578	313,264	239	19,629
December	854	69,865	3,524	256,028	270	24,265
Total	10,738	$1,073,575	59,247	$4,407,277	3,591	$404,249
1927						
January	756	$51,695	3,751	$247,429	118	$7,932
February	883	69,339	3,621	251,849	141	10,239
March	763	72,850	4,590	318,190	81	7,079
April	1,077	96,692	4,991	357,004	125	17,045
May	1,109	93,014	6,021	388,645	136	16,008
June	1,100	106,404	6,929	444,726	159	16,355
Total (6 months)	5,688	$489,994	29,903	$2,007,843	760	$74,658

Industrial Production Slightly Under Record for Last Year

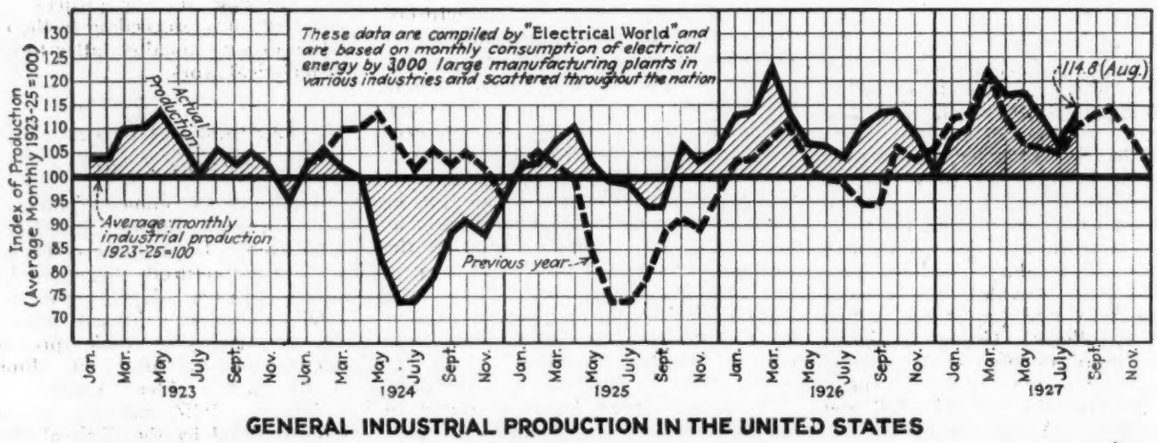
General Conditions Spotty and Irregular—Metals Group 4 Per Cent Below Last Year—Operations in Automobile Manufacturing Plants Drop 18.3 Per Cent

INDUSTRIAL activity during August as indicated by the consumption of electrical energy was about 0.3 per cent under that witnessed during August last year. This is the first month since February that national general productive operations have been under those reported during 1926. The average daily production was approximately at the same rate as that reported for July, production operations having failed to record the expansion which it was expected would take place during August. Various sections of the nation, however, reported industrial conditions widely at variance with conditions in the nation as a whole. New England general productive activity during August was 5.3 per cent over that of last year, and the Southern States reported a 27 per cent increase. On the other hand, general industrial activity in the Middle Atlantic States was 6 per cent under August of last year, and the North Central States reported a 4 per cent decrease in operations. Industrial conditions in the West were about the same as those reported for August of last year.

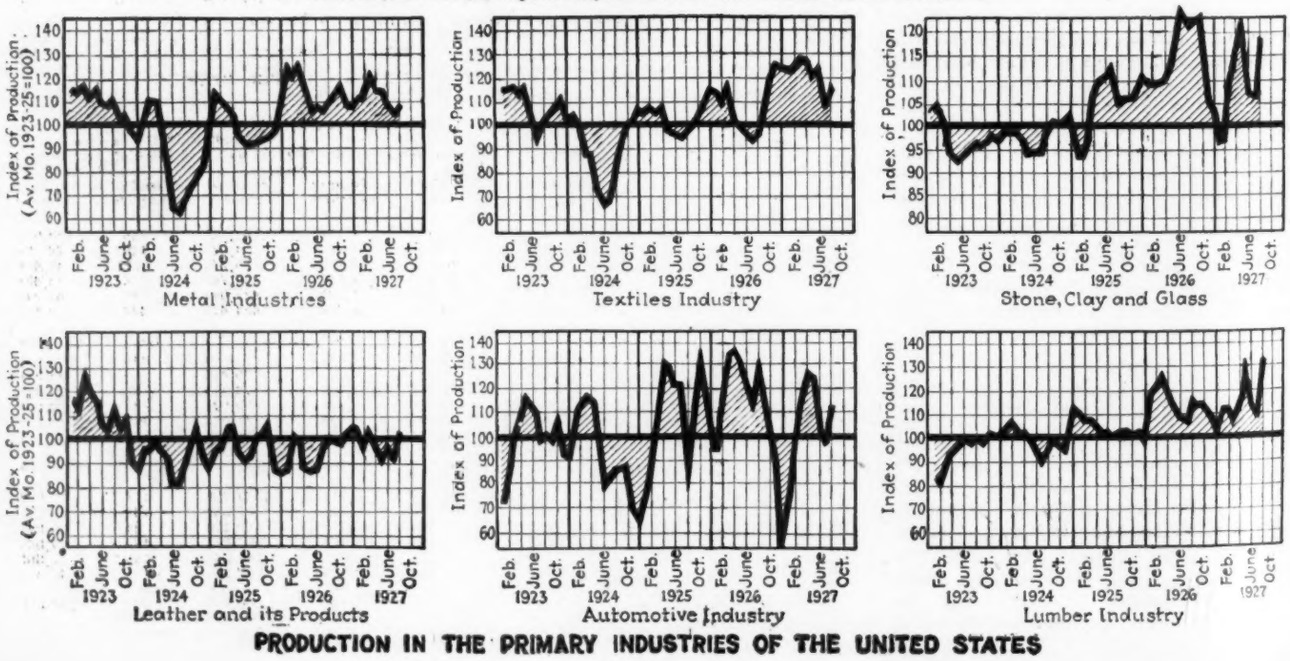
The basic reports indicate that production conditions are very irregular. Within the same industries and in the same section of the nation manufacturing plants reported opposite tendencies. In industries in which the general trend in rate of production during the month was upward many manufacturing plants reported a material drop in operations, while some plants reported near-record activities when the general operating trend of the industry was downward. The manufacturing industry as a whole appears to be marking time awaiting the upward impulse which must come through the channels of distribution. That this impulse is under way and will unquestionably be reflected in materially increased operations during the fall months is indicated from the facts that the average daily bank debits during August were about 3 per cent over those of last year, that the buying power of the agricultural communities this fall gives every indication of exceeding that of last year, and that conservative estimates of trade volume during the fall months for the country as a whole lie between 3 and 6 per cent over last year.

Both branches of the metal industries group reported August operations under those of August, 1926. The rolling mills and steel plants were operating at a rate 1.4 per cent under last year and 5.7 per cent under July. The ferrous and non-ferrous fabricating branches of the metals group witnessed even greater declines from last year, reporting a drop in activity of 6.6 per cent from 1926, but a drop of only 1.3 per cent under July. The metal industries group as a whole registered a decline of 4 per cent under August of last year.

(Data Unadjusted for Seasonal Variation)


These data are compiled by "Electrical World" and are based on monthly consumption of electrical energy by 3000 large manufacturing plants in various industries and scattered throughout the nation
Index of Production (Average Monthly 1923-25=100)
Actual production
Average monthly industrial production 1923-25=100
Previous year
114.8 (Aug.)
Jan. Mar. May July Sept. Nov.
1923
1924
1925
1926
1927

GENERAL INDUSTRIAL PRODUCTION IN THE UNITED STATES



PRODUCTION IN THE PRIMARY INDUSTRIES OF THE UNITED STATES

Market Conditions

BUSINESS in the electrical industry continues spotty, with a fair amount being transacted. Although both central-station companies and industrial plants have been very conservative and in several cases budgets have been reduced, there is no anxiety on the part of any one. There are enough projects under consideration to warrant an optimistic attitude. Switching equipment and transmission-line material sales are at least as high as they were last year, and in some cases higher. An increase of 54,023 tons on unfilled orders was reported by the United States Steel Corporation. The total orders on the books are the largest since the end of April.

General improvement in New England market conditions is reported. High-tension line construction, street and building lighting and an extension to a hydro plant to cost $225,000 figure among the activities. Appliance sales increase 20.2 per cent in August. Little change has occurred in the New York district, but several major orders are expected within ten days. Purchases were chiefly for line equipment and industrial motors. Bush Terminal plans a two-million-dollar extension and a million-dollar power plant is planned in Brooklyn. In San Francisco transformers, meters, relays and street-lighting equipment constitute the major utility purchases. Line extensions are under construction in that territory, and several new office and public buildings are planned. Installation of electric ranges is active in Seattle and appliance sales have increased. The Skagit River dam contract is still under consideration. Activities in Atlanta are satisfactory, with distribution equipment and circuit-breaker sales most prominent. Flatiron sales are also high there. Five textile mills are to be electrified.

Copper and Other Metal Sales Improve

As was expected, the metal business during the week ended Sept. 14 showed an improved tone, but there is not yet any buying movement of importance going on in any of the metals. Copper and silver prices are slightly higher than a week ago, zinc is unchanged, and lead and tin have declined. With New York lead at 6¼ cents, St. Louis lead at 6 cents and the London price between £21 and £22, producers feel that the market is scraping bottom and that consumers waiting for further concessions in the immediate future are likely to be disappointed. Statistics issued Wednesday showed crude production in the United States and Mexico somewhat reduced in August. Refined and antimonial lead, on the other hand, increased, so no cut in production is yet particularly apparent. Stocks of refined lead showed a decrease.

Zinc has again been quieter than usual. The same price has ruled all week—6¼ cents, St. Louis.

NEW YORK METAL MARKET PRICES

	Sept. 7, 1927 Cents per Pound	Sept. 14, 1927 Cents per Pound
Copper electrolytic	13.15	13.225
Lead, Am. S. & R. price	6.40	6¼
Antimony	11¾–11⅞	11⅞
Nickel, ingot	35	35
Zinc spots	6.60	6.60
Tin, Straits	64	65¼
Aluminum, 99 per cent.	26	26

Base copper price Sept. 14, 1927, 15¼ cents.

New England Activity Growing

Increasing activity marks the electrical trade in the Northeast. While no large orders were reported last week, motor sales quickened materially. An important high-tension line material contract was placed for Maine.

Much activity is under way in municipal lighting improvement work in New England. An order for 36 600-cp. lamps and auxiliary transformers was placed for installation at Bath, Me., and a new street-lighting installation is in prospect for Fitchburg, Mass. A flood-lighting installation of six 1,500-watt and 1,000-watt units was ordered for a Boston building.

Appliance sales are gaining, those of one group of utilities totaling $9,266 for the week, against $7,693 a year ago. Contracts will soon be let for hydro-electric equipment representing an outlay of $225,000 for Indian Orchard improvements by the United Electric Light Company of Springfield.

New York Business Quiet but Improving

Improvement is reported in the demand by public utility companies in the New York district for some types of electrical equipment, although the market continues generally quiet. Sales of high-tension switching equipment showed an increase last week, and other orders in this line are expected to be placed during the next ten days. The demand for poles and line hardware, too, was a little stronger than it has been for some time past, but it is still only fair. Buying of transformers and substation apparatus is quiet, and only a small volume of inquiries is reported for this equipment. Among industrial buyers there is a steady market for small and medium-size motors.

The expansion program of the Bush Terminal Company is the largest since the war. It includes the completion of two eight-story loft and manufacturing buildings of steel and concrete construction at a cost of about $2,000,000. The construction of a power plant in Brooklyn at an estimated cost of $1,000,000 is expected to be completed this fall.

Ranges, Switches and Motors Feature Northwest Buying

During the month of August two utility companies sold approximately 600 electric ranges in Seattle, reporting approximately one-third for residences, the remainder for apartments. Sale of other domestic appliances increased with the end of the vacation period. Sales reported last week include two 5,000-kva. turbines and 25 motors from 25 hp. down to two pulp and paper mills and a lumber mill, approximately $5,000 worth of electrical equipment and sawmill machinery for an Oregon mill and 25 motors from 100 hp. down for a grain elevator in Washington. A local central-station company purchased approximately 250,000 lb. of wire for local extensions, mainly in Seattle. Specifications are reported being written for electrical equipment for a two-hundred-thousand-dollar cold-storage plant in Alaska for halibut and herring fisheries.

Line Construction and Textile Electrification in Southeast

Electrical activities in the Southeast for the past week have been satisfactory, with business on the increase, but there are no outstanding features to be noted, the total volume of sales having been made up of a sizable number of small and moderate-size orders. The largest individual order placed was for suspension and pin-type insulators amounting to $7,500. Among other items of line-construction materials were orders for wire and cable amounting to $5,300 and for creosoted pine poles totaling $2,600 placed by one power company. One of the smaller power companies in Georgia ordered oil circuit breakers costing approximately $6,000, and other central-station orders included one for small disconnecting switches costing $2,600 and house-type meters totaling $1,700. The government placed an order for $5,000 worth of clay conduit for use in the extension of lines to air-field beacons. One of the smaller companies in south Georgia this week completed a flatiron campaign in which 500 irons were placed in one town in the short period of the campaign. Another small company, which last week closed a two weeks' campaign on flatirons, reports the sale of 100 more in the week following the campaign, making 550 irons placed in one town in three weeks.

There is a considerable amount of business pending in the industrial field on which announcements are expected soon, but nothing of unusual interest was reported last week. Five partial electrifications of small textile plants were closed in South Carolina, the amount of electrical materials involved amounting to approximately $20,000. A marble company in Georgia has signed a power

contract which involves a partial electrification, and the electrical materials required will aggregate $6,000.

Conditions Improving in Middle West

Business in the Middle West section continues to improve. Reports from agricultural districts indicate favorable conditions, and they are confirmed by the increased business of the mail-order houses. The steel industry in this section anticipates larger production, which has a tendency to further encourage business. Industrial activity is becoming more stabilized and construction work is going on with more rapidity. The various utility companies are busy with fall extension of services, and a fair amount of construction work is going on. The tendency to hand-to-mouth buying, while still in evidence, is becoming less noticeable and utility companies are placing commitments up to the first of the year. Among the interesting orders placed this week were the following: A complete water softening and purifying system with appurtenances, three automatic non-return valves complete with appurtenances, a quantity of blow-off globe and check valves, 10,000 5-amp. watt-hour meters, 600 Thompson meters, 5-amp to 150-amp. capacity, and 100,000 lb. of triple-braid weatherproof wires and cables.

Jobbers report an increasing volume of business, following the usual seasonable tendency. Unusual warm weather has stimulated fan sales and sales of appliances. With the shorter daylight hours an increased demand for incandescent and portable lamps is noticed. Vacuum cleaners are moving in fair volume. Prices remain generally firm.

Marked Improvement in St. Louis District

During the past week there has been a marked improvement in the electrical business. Manufacturers report sales of medium-sized motors for industrial uses to be in good volume. One lot ordered for a cotton mill in the southern part of the St. Louis district amounted to $12,000. Smaller orders for motors and motor-driven pumps have been coming in regularly from the lead-mining district of southeast Missouri. Another order was placed for motors and controllers for shipment southwest, totaling more than $5,000. There also has been a very good demand for poles and pole-line hardware.

Packing, Canning and Building Active on Coast

Last week was a good average week with few outstanding orders. The Feather River Power Company bought a miscellaneous lot of current transformers, meters, relays and accessories valued at $10,000; $2,500 worth of street-lighting transformers were sold for a Stockton job, and the port of Oakland let an electrical contract of $7,000 for its first new shed and warehouse. Lumber companies are buying well, their orders including such items as 2,300-volt "Tirex" cable for steam-shovel lines, 4,000-lb. weatherproof and miscellaneous line material and a 100-hp. motor. A catalog firm intends soon to build in San Francisco a five-story block-wide plant, necessitating 1,000 reflectors and proportionate conduit and wiring supplies. Other San Francisco construction which has been announced includes a five-million-dollar hotel in the downtown shopping district and a 35-story "Shrine" temple. Preliminary work for St. Mary's College, in the Oakland foothills, has necessitated requests for bids on 50,000 ft. of No. 3/0 cable for feeders, approximately $10,000 worth. Power-company purchases have included one carload (or 3,000) of 35-kv. insulators, valued at $7,500, and one carload of 7-ft. six-pin cross-arms.

Activities of the Trade

Railway & Industrial Subjects Switch to Test

Recently the Railway & Industrial Engineering Company, Greensburg, Pa., had one of its "Hi-Pressure" contact switches, a 600-amp., type "TTR," subjected to a number of high-current tests. These tests were conducted by the engineering department of the Public Service Electric & Gas Company to determine the effect of short-circuit stresses and heating on the high-pressure contact. The amount of current given the switch for the four tests was as follows: First, 12,000 amp.; second, 23,000 amp.; third, 22,850 amp., and fourth, 22,750 amp. The last three tests were made in succession with no allowance for cooling and the average duration of flow was 4.15 seconds. The thermometer showed a temperature at the point of contact less than at other points on the switch. This, the manufacturer claims, is owing to the very high contact pressure provided for normal operation, augmented materially by the powerful magnetic attraction of the parallel currents in the vertical jaws, which reduces the resistance.

Sale of Habirshaw Certificates Opposed by Stockholders

Murray B. Karman, C. A. Martin and Mark Wayne, composing a stockholders' committee, have sent a letter to stockholders of the Habirshaw Cable & Wire Corporation, New York, offering objections to the conditions under which the sale of the company's voting trust certificates to the recently organized Eastern Wire & Cable Company was arranged. The committee expresses its opinion that the offer made by the new company through banking interests that purchased 100,000 of the 170,000 voting-trust certificates at $25 per share is not the best that might be obtained. The committee says in its report: "Consider what percentage of your rightful claim $25 a share means for the stockholder who originally held the bonds or claims of the old company. The present offer means 78 per cent of the bonds, if you overlook the fact that the bondholder did not get anything on his investment for six years. If you bear that in mind, then the $25 offer is barely over 50 per cent of the principal and interest on your bond."

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY has placed on the market an electric sandwich toaster which is said to have a number of new features. The unit consumes 600 watts.

THE BLAW-KNOX COMPANY, Pittsburgh, manufacturer of steel products, announces that after Oct. 1 the address of the New York office will be Canadian Pacific Building, 342 Madison Avenue.

THE EDISON ELECTRIC APPLIANCE COMPANY, 5600 West Taylor Street, Chicago, has removed its St. Louis offices to Kansas City. The Kansas City office will serve southern Illinois, Missouri, Iowa, Kansas, Nebraska and the entire Southwest. Earle Poorman, manager of the St. Louis office, will be in charge of the new branch.

THE CUTLER-HAMMER MAUFACTURING COMPANY, Milwaukee, manufacturer of electric controlling devices, announces that the Cleveland office has been moved from the Guardian Trust Building to the Guarantee Title Building, suite 1905, where increased facilities have been provided.

THE HEVI DUTY ELECTRIC COMPANY, Milwaukee, manufacturer of electric furnaces, has appointed H. O. Swoboda, Inc., 3400 Forbes Street, Pittsburgh, representative for its line of electric furnaces for industrial, laboratory and other purposes.

THE EDISON ELECTRIC APPLIANCE COMPANY, Chicago, has purchased 22,500 sq.ft. of ground adjoining its Ontario (Cal.) plant and plans to erect a factory, according to an announcement made by Earl H. Richardson, manager "Hotpoint" division of the company.

THE WARREN TELECHRON COMPANY, Ashland, Mass., is placing on the market a new bakelite "Telechron" for general home use.

New Equipment Available

Anchors

Two new types of anchors, known as the "Traplox" and "Xpandix" anchors, have been developed by the W. N. Matthews Corporation, St. Louis. The "Traplox" anchor is of the plate type and is made in three sizes, Nos. 90, 120 and 160. The numbers denote the approximate area of the plate in square inches. The "Xpandix" anchor is of the expanding type and is made in two sizes, the No. 8 two-way and the No. 20 five-way. All parts are made of certified malleable iron. The No. 8 is recommended for use with a 10,000-lb. guy strand and the No. 20 for use with a 16,000-lb. guy strand in ground where it is possible for two men to bore an 8-in. hole 6 ft. deep in not to exceed 20 minutes. The No. 20 anchor expands to 20 in. in diameter.

Portable Standard Watt-Hour Meter

A new type "OB" portable standard watt-hour meter has recently been placed on the market by the Westinghouse Electric & Manufacturing Company.

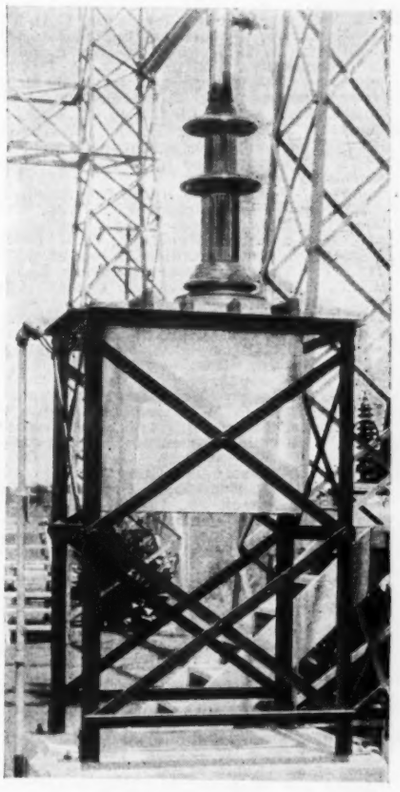
The new meter is provided with compensation for temperature errors at both unity power factor and low power factor. This compensation is inherently permanent for both the electromagnets and the permanent magnets and does not depend on the movement of mechanical parts with the variation in temperature. The company claims for this meter superior accuracy along with a decrease in size and weight. The micrometer adjustments have been simplified and the electromagnets are of the one-piece "OB" type. A zero reset is provided by which both pointers can be set on zero. Potential settings are changed by means of a small switch and three current binding posts are used, so that the meter may be connected for either 1-amp. or 10-amp. capacity.

Generator for Charging Bus-Control Batteries

The diverter-pole generator for charging bus-control batteries, a device which up to a given point will hold the voltage more nearly constant than a compound-wound machine, but beyond this point tends to become a constant-current machine, has been developed by the Rochester Electric Products Corporation, 85 Allen Street, Rochester, N. Y. When operated with a bus-control battery the generator will carry the lighting and fixed coil load and also furnish a trickle charge for the battery. In the case of switch operation, instead of dropping its load as does a shunt machine, the generator carries its share of the load so that the battery carries the peak only. In case there should be more than the usual amount of switch operation or an emergency requiring more than the usual amount of energy from the storage battery the charging rate would automatically vary.

Instrument-Current Transformers

The type "OA" instrument current transformer, originally produced by the Pacific Electric Manufacturing Company, 5815 Third Street, San Francisco, for installation within the tanks of its oil circuit breakers, is now available



TYPE "OA" INSTRUMENT CURRENT TRANSFORMER INSTALLED

for individual mounting and for installation other than within the circuit-breaker tanks. The company states that the successful operation of these transformers under the severe conditions existing within the circuit-breaker tanks has resulted in a demand which is to be met by this new product. The current transformers have wound primaries and can be furnished with multiple ratio windings. Tap leads are brought out to the entrance bushing terminal so that the ratio may be varied without disturbing the mounting or oil tank. The transformers are said to have high insulating valves and accurate ratio and phase-angle curves. The units are oil-immersed and the insulation consists of oil and concentric bakelite tubes.

Automatic Starter

An across-the-line type alternating-current automatic starter equipped with thermal overload relays has been placed on the market by the Industrial Controller Company, Milwaukee. The unit is of the remote-control type and is furnished with a start-and-stop push-button in the cover, without a push-button or with a three-point switch. The thermal relay used is reset by pressing a rod on the outside of the starter cabinet. By removing two screws the thermal unit can be changed to give a different horsepower rating. The maximum horsepower rating of the starter is 2, and it is designed for use on any voltage up to 550.

Dimmer Flasher

A moderately priced dimmer flasher suitable for show-window lighting, decorative lighting, sign lighting, electric fountains, or wherever a dimmer effect is desired, has just been developed by the Reynolds Electric Company of Chicago.

The dimmer plates are of special design made by Ward Leonard. The dimmers are mounted on a framework and geared to Reynolds motors.

INSULATOR.—A 23,000-volt "Pyrex" pin-type insulator with either a 1-in. or a 1⅛-in. pinhole has been placed on the market by the Corning Glass Works, Corning, N. Y. This insulator has a dry flashover of 84,000 volts and a wet flashover of 50,000 volts.

SAFETY FUSE REMOVER.—The Bush safety cartridge fuse remover, which is said to replace three old-style fuse pullers, has been placed on the market by the Bush Electric Company, 6616 Morgan Avenue, Cleveland. It has a fuse capacity of ⅛ in. to 3 in. and will pull virtually any size of commercial fuse. Each unit is tested to withstand 25,000 volts and is unbreakable.

SMALL-CAPACITY MELTING POT.—An electric melting pot, for melting solder, lead, babbitt, tin, etc., with a capacity of from 27 lb. to 40 lb., according to the metal to be melted, has been introduced by the General Electric Company. This pot may be operated on either 110-volt or 220-volt alternating- or direct-current circuits and is made in two ratings, 750 watts and 1,000 watts. The new pot consists of a sheet-steel cylindrical casing 10 in. deep and 9 in. in diameter, in which is supported a cast-iron crucible 4 in. deep and 6 in. in inside diameter. The space next to the crucible is insulated with a compact heat insulator. Heating units are of the cast-in, sheath-wire type.

Electrical Patents

Announced by U. S. Patent Office

(Issued Aug. 30, 1927)

16,721 (reissue). ELECTRICAL SYSTEM FOR LOCOMOTIVES; S. W. Farnham, Chicago, Ill. App. filed July 18, 1927. Mine locomotive.

1,640,361. METHOD OF MAKING ELECTRIC HEATERS; E. N. Lightfoot, Milwaukee, Wis. App. filed Feb. 5, 1921. Method of insulating the resistor of an electric heater from the inclosing jacket.

1,640,424. AUTO-TRANSFORMER; K. K. Paluev, Pittsfield, Mass. App. filed Jan. 29, 1926. Having some of its winding turns provided with tap connections and a tap switch for varying the ratio of voltage transformation.

1,640,428. ELECTRODE FOR ELECTRIC DISCHARGE DEVICES; F. Skaupy, M. Pirani, F. Bahr and W. Fehse, Berlin, Germany. App. filed Oct. 30, 1923.

1,640,434. SOCKET ADAPTER; F. H. Weston, Bridgeport, Conn. App. filed July 5, 1923. Whereby a lamp with an "Edi-Swan" type of base may be readily connected in operative relation to a standard Edison socket.

1,640,437. ELECTRIC WELDING; V. J. Chapman, Schenectady, N. Y. App. filed Feb. 16, 1925. Wherein a backing member is arranged to be maintained in contact with the metal of the weld during the welding operation.

1,640,438, 1,640,439. MERCURY METER; F. P. Church, Lynn, Mass. Apps. filed July 3, 1923, and Jan. 16, 1925.

1,640,443. ELECTRICAL DISCHARGE DEVICE; P. K. Devers, Lynn, Mass. App. filed Dec. 27, 1926. With improved starting arrangement.

1,640,447. THERMAL-RESPONSIVE SWITCH MECHANISM AND PROTECTIVE SYSTEM EMPLOYING THE SAME; App. filed Dec. 16, 1924.

1,640,449. RESISTANCE LINE WELDING; E. M. Hewlett, Schenectady, N. Y. App. filed Nov. 22, 1924. Wherein the electric current supplied to the weld is periodically varied in value to permit alternate heating and cooling of the metal parts forming the weld.

1,640,450. ARC LIGHT; A. Ihlin, Berlin-Charlottenburg, Germany. App. filed Dec. 24, 1923. Tungsten-arc type of light.

1,640,455, 1,640,456, 1,640,457. HIGH-TENSION SWITCH; F. P. Lawler, San Francisco, Cal. Apps. filed July 9, 1924. Provided with weather protection and having a power-line grounding switch.

1,640,464. ELECTRIC MICROMETER; A. V. Mershon, Schenectady, N. Y. App. filed July 31, 1923. For measuring small distances between relatively moving and stationary bodies of magnetic material.

1,640,469. LEADING-IN CONDUCTOR; V. L. Ronci, Brooklyn, N. Y. App. filed May 2, 1923. For the electrodes of high-power vacuum tubes.

1,640,488. DRY CELL AND LINING FOR SAME; C. P. Delbel and W. G. Waitt, Lakewood, Ohio. App. filed Nov. 19, 1926.

1,640,507. COMBINED TROUBLE LIGHT AND CIGAR LIGHTER; H. C. Liebing, Cleveland, Ohio. App. filed Nov. 20, 1924. Six-volt type.

1,640,521. BOX CONNECTER; F. T. Wheeler Plainville, Conn. App. filed Dec. 5, 1921. For meter wiring.

1,640,539, 1,640,540. TRANSMISSION SYSTEM; R. D. Evans, Wilkinsburg, Pa. Apps. filed April 26 and Sept. 28, 1923. For the transmission of power at high voltages over long distances.

1,640,542. CIRCUIT-CONTROLLING APPARATUS; B. F. Fuller, Pittsburgh, Pa. App. filed July 27, 1922. For controlling light circuits used in illuminating theater stages, auditoriums, etc.

1,640,547. VARIABLE-SPEED INDUCTION-MOTOR SET; C. W. Kincaid, Wilkinsburg, Pa. App. filed March 15, 1922.

1,640,554. CURRENT TRANSFORMER; J. F. Peters, Edgewood Park, Pa. App. filed Oct. 1, 1925. That shall automatically compensate for errors due to the magnetizing currents necessary to energize itself.

1,640,555. ELEVATOR CONTROLLER; H. P. Reed, Milwaukee, Wis. App. filed Oct. 29, 1921.

1,640,556. CONTROL APPARATUS; L. G. Riley, Wilkinsburg, Pa.; A. H. Candee, Forest Hills, Pa., and M. F. Jones, Wilkinsburg, Pa. App. filed Feb. 14, 1921. Switching device that opens and closes energized circuits.

1,640,558. OPERATING DEVICE AND DISCONNECTING SWITCH; C. A. Aalborg, Pittsburgh, Pa., and F. C. Wilharm, Homewood, Pa. App. filed Jan. 8, 1923.

1,640,559. CONTROL SYSTEM; E. M. Bouton, East Pittsburgh, Pa. App. filed April 12, 1921. For elevators, dumbwaiters, etc.

1,640,560. VOLTAGE-REGULATOR SYSTEM; W. M. Bradshaw, Wilkinsburg, Pa. App. filed June 23, 1925.

1,640,617. DRY BATTERY; E. J. Reich, Brooklyn, N. Y. App. filed May 22, 1923. Of the multicell type; terminal and handle mount.

1,640,701. ELECTRIC SAFETY DEVICE; C. E. Hanny, Unionville, Conn. App. filed Oct. 19, 1925. Thermostatic switch devices.

1,640,735. PROCESS OF MAKING CHANNELED CONTINUOUS ELECTRODES; C. W. Soderberg, Oslo, Norway. App. filed May 10, 1924.

1,640,744. MEANS FOR PROTECTING CABLES FROM KINKING AT THE POINT WHERE THEY EMERGE FROM JUNCTION BOXES OR CASINGS; G. Zapf, Cologne-Mulheim, Germany. App. filed Feb. 5, 1926.

1,640,755. ELECTRIC SWITCH; R. C. Deale, Plainfield, N. J. App. filed Aug. 25, 1923. A portable switch that shall control the circuits of the main and the feed motor of a planer or of a similar machine tool.

1,640,793. HAND ARC LAMP; S. M. Meyer, Brooklyn, N. Y. App. filed Feb. 20, 1926.

1,640,798. METHOD OF ELECTRIC WELDING; T. E. Murray, Jr., Brooklyn, N. Y. App. filed Aug. 19, 1922. Method of joining two parts of sheet or other metal by welding.

1,640,799. AIR-COOLED INDUCTOR COIL; E. F. Northrup, near Princeton, N. J. App. filed Aug. 1, 1925. For use in an inductor furnace.

1,640,814. DISTRIBUTION UNIT FOR ELECTRIC CIRCUITS; W. C. Blackwood, Elmhurst, N. Y. App. filed Feb. 21, 1922.

1,640,815. INSULATOR; H. D. Brookman, East Liverpool, Ohio. App. filed Feb. 17, 1922. A single-piece insulator for knob-and-tube work.

1,640,816. VENTILATED THERMOCOUPLE; R. P. Brown, Philadelphia, Pa. App. filed Sept. 3, 1925.

1,640,826. ELECTRIC FURNACE; C. B. Foley, Pottstown, Pa. App. filed March 23, 1922.

1,640,829. INCANDESCENT ELECTRIC LAMP; J. A. Heany, New Haven, Conn. App. filed May 15, 1918.

1,640,845. TRAFFIC SIGNAL; A. J. Massey, Los Angeles, Cal. App. filed July 2, 1921.

1,640,867. ELECTRIC INCANDESCENT LAMP; H. Workman, Glasgow, Scotland. App. filed Feb. 7, 1923.

1,640,869. JOINT BETWEEN ELECTRICAL CONDUCTORS; R. W. Armstrong and I. E. McCabe, Chicago, Ill. App. filed Dec. 16, 1922. Flexible connection to a lead-in wire.

1,640,877. ALTERNATING-CURRENT WELDING SYSTEM; J. R. Brueckner, Bay City, Mich. App. filed March 26, 1924, In which a high voltage is employed and in which means is provided for automatically switching to a relatively low open-circuit voltage.

1,640,900. SHORT CIRCUITER; E. P. Larsh, Dayton, Ohio. App. filed Feb. 15, 1924. For repulsion-start induction motors.

1,640,913. ELECTRIC ARC LAMP FOR PHOTOGRAPHING; H. Traut, Munich, Germany. App. filed Dec. 24, 1926.

1,640,922. PROCESS OF PREPARING POSITIVE ELECTRODES OF STORAGE BATTERIES; A. Cellino, Buenos Aires, Argentina. App. filed June 15, 1916.

1,640,966. FLASH-PRODUCING APPARATUS; L. Seguin and A. Seguin, Paris, France. App. filed Feb. 23, 1926. In which flashes are produced in tubes containing rarefied gas or containing vapor, at stated intervals, for instance in order to illuminate an object under examination and to produce stroboscopic effects.

1,640,972. BRAKE; J. N. Anderson, Hoboken, N. J. App. filed Jan. 14, 1927. For elevator hoisting machines.

1,641,002. THERMOSTATIC-CONTROL ELECTRICAL HEATER PLUG; L. M. Kaplan, Philadelphia, Pa. App. filed Oct. 27, 1926.

1,641,067. DOOR-OPERATING MEANS; C. A. Connelly, Shelby, Ohio. App. filed March 31, 1926.

1,641,068. INCANDESCENT ELECTRIC LAMP; F. Czech, Wichita Falls, Tex. App. filed June 17, 1925. Double filament.

1,641,071. ELECTRIC TRAIN-LINE SWITCH; C. C. Farmer, Pittsburgh, Pa. App. filed March 19, 1924.

1,641,085. RIVET HEATER; W. E. Irish, Cleveland, Ohio. App. filed June 2, 1921.

1,641,122. RIVET HEATER; P. J. Culhane, Jr., Cleveland, Ohio. App. filed June 2, 1921.

1,641,134. ELECTRIC SWITCH; D. H. Chason, Elizabeth, N. J. App. filed Jan. 23, 1925. Adapted for use in incandescent lamp sockets which has quick-make-and-break movements.

New Trade Literature

ELECTRICITY ON THE FARM.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has published in the interest of farm betterment an illustrated and informative 48-page treatise on the applications of electricity in rural life. The pamphlet, which is entitled "Electricity the Pathway of Prosperity," shows what can be done with electricity on the farm, in the dairy, in the poultry house and in the farmer's home and gives the average cost of operating socket and separate-outlet appliances at various rates for energy. It is admirably adapted for farm circulation by electric light and power companies because it is non-technical and simple in treatment. It contains good and appropriate illustrations and a comprehensive index.

CELESTIALITE GLASS.—The Gleason-Tiebout Glass Company, 200 Fifth Avenue, New York City, has issued catalog No. 727, covering its plain "celestialite" glass.

OIL-TEMPERING BATHS.—Bulletin GEA-801 issued by the General Electric Company, Schenectady, N. Y., describes and illustrates the electrically heated General Electric oil-tempering baths for tempering carbon steels.

VAPORPROOF FIXTURES.—The Crouse-Hinds Company, Syracuse, N. Y., is distributing pamphlet No. 93, describing and illustrating "type ARB" vapor-proof fixtures.

FIRE-DETECTING SYSTEM.—The Garrison Fire Detecting System, Inc., 79 Madison Avenue, New York City, has issued a catalog on automatic fire detection. A description and illustration are given of the automatic fire-detecting wire, the new "No. 24-I&T" Garrison system, and other parts of the system are also illustrated and described.

ALLOYS.—Bulletin No. 101 issued by the Electric Devices Company, 67 Barclay Street, New York City, covers the "EDCO no-resistance contact alloys." This bulletin contains a description of what they are and their uses.

ELECTRICITY IN THE COAL MINE.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued circular 1782, describing and illustrating cutting, loading, conveying, haulage, hoisting, ventilation, tipple and breaker drive and pumping and power distribution as applied to coal mines. The special features necessary to make electrical apparatus safe for mine work are discussed, as are also the advantages gained by the use of such apparatus.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

An agency is desired in London, England (No. 26,951), for advertising devices for stores, industrial and domestic lighting fixtures and lighting bowls.

An agency is desired in Vienna, Austria (No. 26,940), for household electrical appliances.

An agency is desired in Lima, Peru (No. 26,952), for automobile lamps.

An agency is desired in Toronto, Canada (No. 26,950), for railway signal, floodlighting equipment and telegraph and telephone material.

Purchase is desired in Cairo, Egypt (No. 26,943), of wiring supplies.

An agency is desired in Suttgart, Germany (No. 27,038), for electrical household appliances, motors and fans, flashers for signs, electric tools and novelties, and radio sets and parts.

An agency is desired in Dresden, Germany (No. 27,039), for portable electric tools.

Purchase and agency are desired in Alexandria, Egypt (No. 26,991), for insulated and uninsulated copper wire.

An agency is desired in Bangalore City, India (No. 26,996), for wiring supplies.

Business Facts for Electrical Men

Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

Machinery Manufacture Leads in Electrification

OF THE sixteen groups recognized in the Census of Manufactures, the manufacture of machinery makes the largest use of electric power in proportion to its entire power installation. It is practically 100 per cent electrically driven, 70 per cent by purchased energy and 30 per cent on energy generated in its own plants. Of a total of about 2,700,000 hp., nearly 1,900,000 hp. is in motor drive using purchased energy. This leaves 800,000 hp. in mechanical prime movers. Very little of this, however, seems to be used directly. The whole amount is just about sufficient to take care of the 526,716 kw. of generators and 927,720 hp. of electric motors run from them.

Almost as completely electrified we find the manufacture of transportation equipment. This is to be expected. The thoroughly modern automobile industry constitutes a major element in the group, which as a whole is closely related to the preceding one and hence ought to have similar characteristics. A third of its installation uses privately generated electrical energy, two-thirds is on other circuits. Substantially the same may be said of the rubber industry, though the latter is only a third as important a power user.

The heaviest actual user of power, electric as well as mechanical, is the iron and steel industry, with 2,436,010 hp. of motors run by purchased energy. It has nearly 3,000,000 hp. in other electric drive and over 2,000,000 hp. in direct mechanical drive.

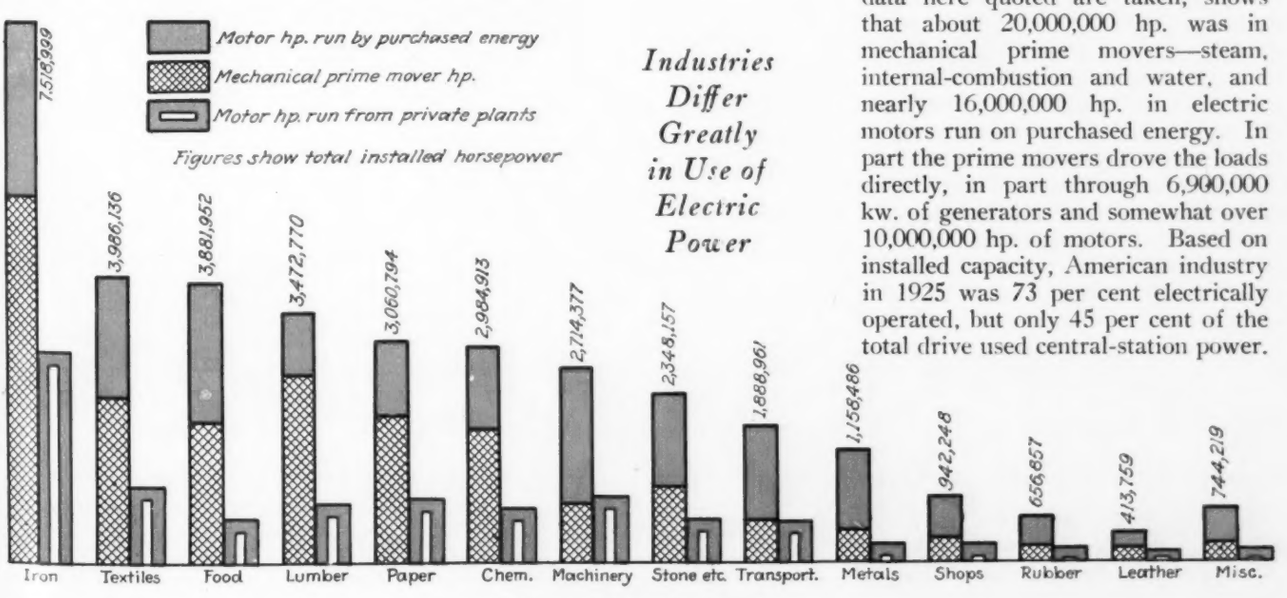
At the other end of the scale stands the lumber and wood industry, fourth largest in total power installation, but eleventh as a central-station load and fifth as a user of energy generated in private plants.

The remaining groups in which electric drive is still far from universal adoption are the textile, food, paper and chemical industries and the manufacture of stone, clay and glass products, though this last industry is farther along than the others.

Because of their relatively modest use of power, two groups recognized by the census—musical instruments and phonographs and tobacco manufactures—have been included with miscellaneous industries in the chart. The former (musical instruments and phonographs) is noteworthy as the only group having a greater motor horsepower on its own plants than on outside lines. The difference is emphatic—49,522 hp. against 38,661 hp.

Taking the manufacturing industries in the aggregate, the 1925 Census of Manufactures, from which the data here quoted are taken, shows that about 20,000,000 hp. was in mechanical prime movers—steam, internal-combustion and water, and nearly 16,000,000 hp. in electric motors run on purchased energy. In part the prime movers drove the loads directly, in part through 6,900,000 kw. of generators and somewhat over 10,000,000 hp. of motors. Based on installed capacity, American industry in 1925 was 73 per cent electrically operated, but only 45 per cent of the total drive used central-station power.

Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers of the ELECTRICAL WORLD to quote or use these statistics for any legitimate purpose. While there is no requirement that the source of data be given, yet it would help the ELECTRICAL WORLD in obtaining and compiling further basic information if those who make use of these statistics would give credit to the ELECTRICAL WORLD.



Industries Charted

1. Iron and steel and their products, not including machinery.
2. Textiles and their products.
3. Food and kindred products.
4. Lumber and allied products.
5. Paper, printing and related industries.
6. Chemicals and allied products.
7. Machinery, not including transportation equipment.
8. Stone, clay and glass products.
9. Transportation equipment: air, land and water.
10. Metals and metal products other than iron and steel.
11. Railroad repair shops.
12. Rubber products.
13. Leather and its manufactures.
14. Miscellaneous industries.

New England Production High

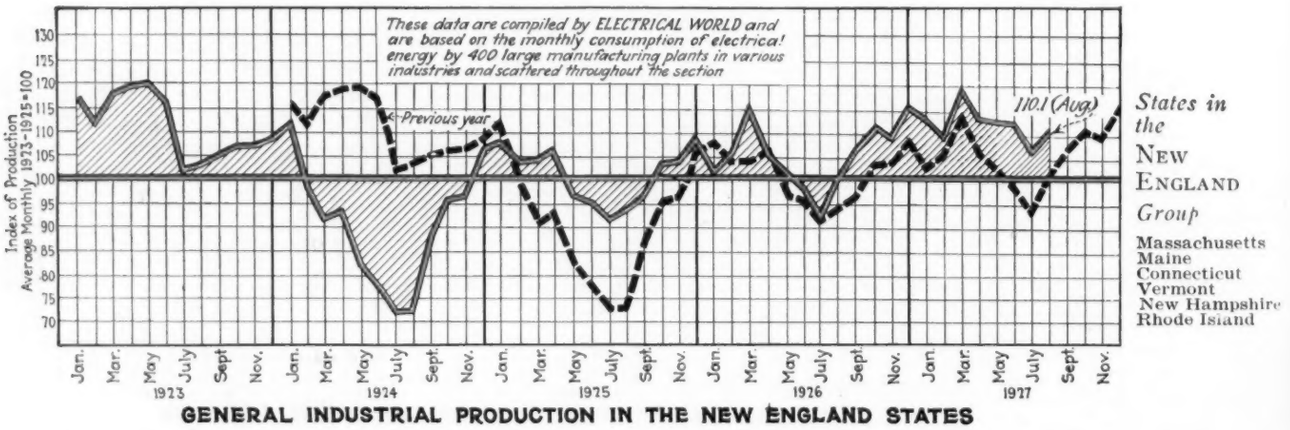
THAT the manufacturing plants in the New England States ended the summer season with productive activity well above that of the same period last year is indicated by reports of monthly consumption of electrical energy made to the ELECTRICAL WORLD by about four hundred manufacturing plants operating in that section and in various industries. General industry in New England has been operating above the activity of the same month in the previous year ever since January, 1926. The peak of operations during the present year was reached in March, since which time there has been a gradual decrease in activity of a more or less seasonal nature. This decline was continued in August, for although the actual production in August was 3.4 per cent above that of July, the rate of production after corrections are made for number of working days was 4.5 per cent under July. It was, however, 5.3 per cent above August, 1926.

This increased rate of general production during the past year was due very largely to the high rate of operations which has been prevalent in the textile plants of New England since July of last year. August operations in these plants, however, were about 7.6 per cent under July, indicating that the recent upward trend in the price of cotton is having its retarding effect on textile production. While the August activity was about 17 per cent above August activity of last year, it is doubtful if the operations during the coming months will exceed those reported during the same period last year. On account of their heavy weighting a decreased activity in the operations of the New England textile mills will undoubtedly result in an index of general production under that of last year.

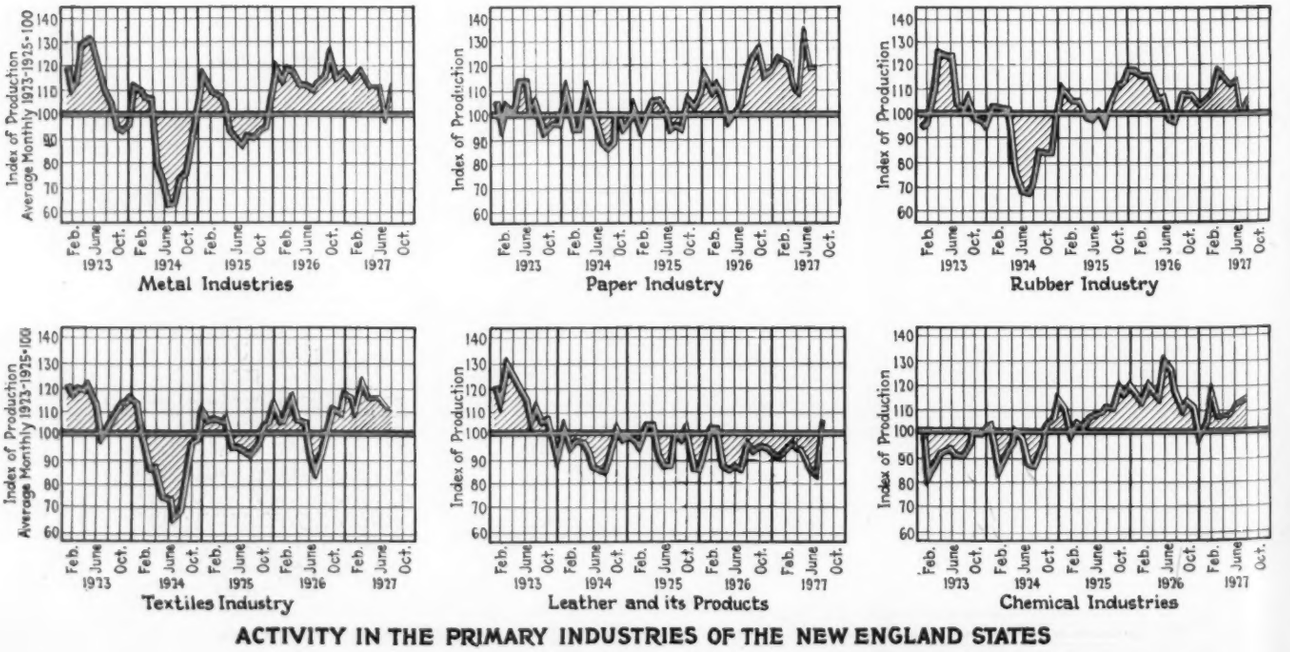
The rubber goods manufacturing plants of the section were operating during August at a rate about 2.5 per cent under the operations reported for July, but about 3.2 per cent above August of last year. The peak of the productivity of these plants was recorded in March, since which time the activity has steadily declined. September will probably witness an upward turn in the production.

ELECTRICAL WORLD *Barometer of Industrial Activity in the New England States*

(Data Unadjusted for Seasonal Variation)



GENERAL INDUSTRIAL PRODUCTION IN THE NEW ENGLAND STATES



ACTIVITY IN THE PRIMARY INDUSTRIES OF THE NEW ENGLAND STATES